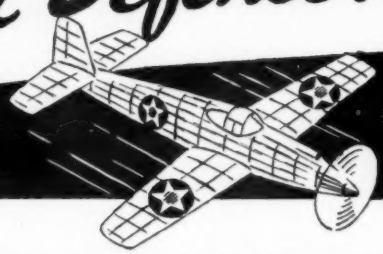
MODEL Airplane NEWS

APRIL 1942
20c

BOMBING SQUADRON S

1941 NATIONALS MULVIHILL WINNER

MODEL-AIRPLANE BUILDING IS AN *Essential Defense Activity!*



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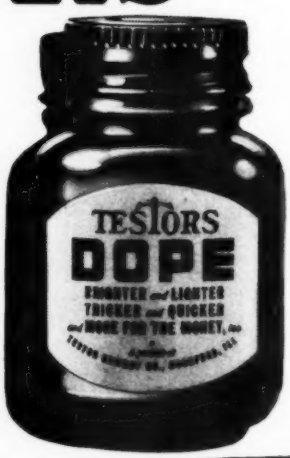

CEMENTS and DOPES

A COMPLETE LINE AT ALL LEADING 5-AND-10c STORES AND HOBBY SHOPS

TESTOR CHEMICAL CO., ROCKFORD, ILLINOIS, U. S. A.
World's Largest Manufacturers of Model Airplane Chemicals

Special to MODEL AIRPLANE NEWS

MAJOR GENERAL MILLARD F. HARMON has been assigned to duty as Chief of the Air Staff, Army Air Forces with headquarters in Washington, D.C., it was recently announced. Brigadier General Carl Spaatz, remembered as leader of the famed "Question Mark" refueling flight, has been appointed Chief of the Air Force Combat Command. Replacing Harmon's former command of the 2nd Air Force is Major General F. L. Martin, who was relieved of his Hawaiian Department command. Major General Barton K. Yount has been placed in command of the newly formed Training Command to handle more effectively the job of teaching 30,000 new pilots, observers, gunners and navigators.

William S. Knudsen, Director of Production in the Secretary of War Department office, has been commissioned a Lieut. General, second only to General Marshall and McArthur in rank. This move, it has been rumored, was necessary when Knudsen, a civilian, didn't get cooperation from Army officers.

T.W.A. has turned over to the Army its fleet of five Boeing Stratoliners, to be stripped of their luxurious fittings making available their full capacity and longest possible range for military purposes. The Army has promised to replace these with equal seating capacity of another type plane, possibly the Douglas cargo now widely used. The Stratoliners are to be used for "special purposes" for which "high speed" and "long range" are essential!

New, and lower, entrance requirements for Army Air Forces come as a welcome move to thousands of youthful aspirants who haven't been able to "make the grade" heretofore. If you are between 18 and 26, physically fit with "perfect" eyesight and can pass a new simplified entrance examination (replacing the two years college formerly required) you can become an aviation cadet. Even married men with no dependents can now be accepted. See your nearest Army recruiting office or any flying school.

In response to hundreds of patriotic requests, a second all-negro pursuit squadron has been formed. To be designated the 100th Pursuit Squadron, this new unit will join the 99th Pursuit Squadron now in service at the new airbase at Tuskegee, Alabama. Graduates of these school squadrons will be commissioned 2nd. Lieutenants and will be ordered to instructional duties to train other negro aviation units.

Defying the submarine infested waters of the eastern Pacific, the second class of Chinese Aviation Cadets has arrived in this country and is now in Primary training at Thunderbird Field, Glendale, Arizona. According to Major J. C. Horton, base commander, the oriental students are given flight training identical to that of American flying cadets with exception of fundamental military drill, to be given by Chinese officers because of certain maneuvers and regulations peculiar to the Chinese Army. The first contingent is now undergoing basic training at Higley, Arizona, and will soon be en route to their homeland to join those already battling the invading Japanese.

Priorities have at last been worked out for governmental officials on airlines. While it is not believed the number of such officials will be large, arrangements have been made so seats will be available to the general public after governmental personnel have been provided for. Army, Navy, Marine Corps, governmental agencies, departments and personnel of the White House are to be accorded prior privileges for their trips.

Complications have arisen over the "Buy a Bomber" campaign now flourishing in many newspapers and aircraft factories. Regulations permit the government to accept contributions for the Army and Navy provided there are no restrictions on the contribution and these patriotic campaigns have, naturally, been for the restricted purpose of buying a bombing plane. Final solution seems to be circumvention because $50,000 donated to the government releases other money to purchase the bomber. To do our part, physical or financial, is every American's privilege and Uncle Sam sincerely appreciates these contributions. Simplest way is: BUY DEFENSE BONDS AND STAMPS!!

The Army Ordnance Department has announced mass production of 20 millimeter aircraft cannon has been attained, manufacture tripled within the past month and there is every indication that the rapid production rate will continue. This gun fires an armor-piercing and high explosive shell with machine-gun speed, yet has a greater calibre than any machine-gun used by the Army. These automatic weapons are now standard equipment on U.S. war planes such as Lockheed, Bell, Republic, North American and Curtiss pursuit planes.

Under Secretary of War Robert P. Patterson states that since the Japanese attack on Pearl Harbor a total of $1,039,000,000 worth of contracts for aircraft, aircraft parts, machine-guns, cannons and airplane engines have been placed with the automobile industry, chiefly General Motors, Chrysler and Ford groups, this in addition to work already contracted for by these huge firms prior to that date.

That civil aviation is no longer free was indicated recently when Brig. Gen. D. H. Connolly, was appointed Military Director of Civil Aviation. However, private flying will receive the greatest cooperation from his office, for Connolly was for 18 months,

(Continued on page 54)

13TH YEAR OF PUBLICATION

MODEL Airplane NEWS

APRIL, 1942 VOL. XXVI, No. 4

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Edited by
Charles Hampson Grant

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Aviation has JOBS for thousands but CAREERS only for trained men!

The tremendous responsibility of aviation in America's war effort has made it possible for thousands of men to obtain semi-skilled, single-phase jobs in the aircraft industry through cheap "quickie" courses. BUT—the only man who is ESSENTIAL to the industry is the man with the long-range training to fill any of the important supervisory positions to which he may be assigned. Only by such training can YOU be unquestionably designated as ESSENTIAL to vital war production—and continue to be essential to the industry through the readjustments that must follow when war production shifts back to peace time schedules. Only the Career man is essential to aviation!

The executives who have made aviation THEIR career want only those men with the intelligence and sincerity to select aviation as a life work and to adequately prepare themselves for it by proper training. They know that the value of each man is largely determined by the ability and experience of those who train him for his career. And they know that Curtiss-Wright Technical Institute graduates are—and for many years have been—precisely trained to fill the industry's exacting requirements.

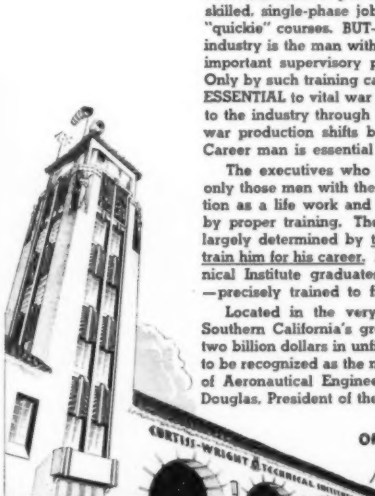
Located in the very center and a very important part of Southern California's great aircraft industry, with its more than two billion dollars in unfilled orders, Curtiss-Wright Tec has come to be recognized as the nation's leading institution for the training of Aeronautical Engineers and Master Mechanics. Mr. Donald Douglas, President of the great Douglas Aircraft Company, chose this school for his own son's training, which pointedly indicates the high standing Curtiss-Wright Tec has attained in the aircraft industry since its establishment in 1929.

It is imperative that before you invest in a course of career training you determine what the returns will be on your investment . . . for your choice of a school in which to take your training will determine how much money you will make all the rest of your life.

Curtiss-Wright Tec's career training is carefully designed to do just one thing:—TO MAKE MONEY FOR YOU, so upon graduation you can be independent and self-supporting for life. Our thousands of successful graduates have proven that Curtiss-Wright Tec training gets results and always pays, since it trained them in advance for the highest position they could ever expect to occupy. It can do the same for you.

This school has never guaranteed positions for its graduates, but practically every graduate has obtained immediate employment and is advancing rapidly. The demand for our graduates far exceeds the supply, and we honestly believe that every student who enrolls here will be able to obtain, with our assistance, immediate employment upon graduation.

WARNING!—"Don't miss the boat." The greatest opportunity in your lifetime exists today! There never was such an opportunity in aviation for you; there may never be another. A position awaits you. Insure for yourself a steady income and independence for life. DON'T FOLLOW—LEAD! Send in your enrollment before you "miss the boat."



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"My Work with Models Saved More than 3 Months Training Period"

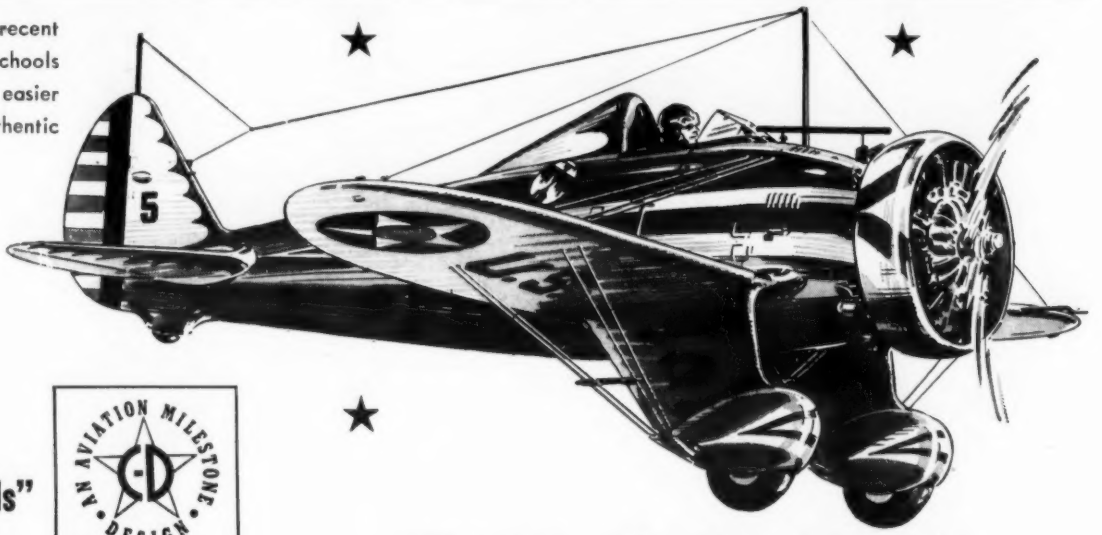
—writes an Air Corps Primary Flying School Student

Others make similar claims. Forbes Magazine states in a recent timely article: "A study of leading pilot and mechanic schools shows that most students are aeromodelers." There isn't an easier way to learn aviation fundamentals than building these authentic scale

CLEVELAND MODELS

"America's FIRST LINE of Flying Models"

★ They Win More Compliments, More Honors, More Prizes Than Any Other Line of Models in the World ★

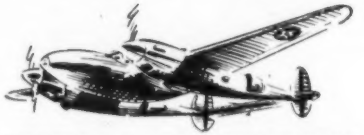


AN AVIATION MILESTONE • CD • DESIGN

Cleveland's Newly Adopted Emblem for Master Scale Models

BRITISH SPITFIRE

This realistic Cleveland model of the "Pride of the RAF" is the pride of any builder. Beautiful 27⅝" model of England's popular interceptor fighter. Large wing area makes this an excellent flyer. Speedy.
Master Kit SF-5..... **$3.00**



LOCKHEED P-38 "LIGHTNING"

The world's fastest fighter, so fast that you don't hear it, they claim, till it's past you, beautifully modeled. Span 38⅜". A superpowered twin motor model that's speedy, realistic and an absolute "must" among model builders who want the newest and best.
Master Kit SP-85..... **$4.00**

"Model of the Month"

BOEING P-26

Now Widely Used for Advance Training

It's the plane that has won the reputation of being "a real *man's* airplane," being one of the first low wing fighters produced in quantities for the U. S. Army. It is really an authentic design you should have in your line-up of military planes which will give you a "fast and furious" performance. This design may employ the most dazzling color combination of the entire CD fleet with its yellow wings, blue fuselage and landing gear deftly trimmed with dazzling red and white scalloping as illustrated. It is an "Nth Degree" model for detail with a beautiful radial engine in the nose. Span 21". Complete kit No. SF-60 only..... **$2.50**

Master Kit SF-3 ..... $3.00

Master Kit SF-85 ..... $4.00

engine in the nose. Span 21". Complete kit No. SF-60 only $2.00

CURTISS P-40 "TOMAHAWK"

Deadly in swiftness, accuracy and fighting efficiency. Christened "Tomahawk" by the British, who've ordered great numbers. Beautiful 28" span model. A beauty to build and to fly. Master Kit SF-77 ..... **$3.00**

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To Men in the Allied Air Corps*

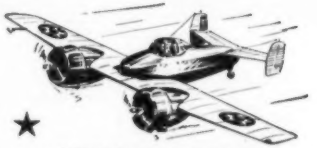
whose letters to us, about how modelbuilding has helped them in their flying work, are published in our ads. Word them your own way—don't worry about spelling, or appearance—a post card will do. Get busy NOW. Send yours today. Also mention what scale Kit you desire, for letters published. (GP-66 and 69 excluded)

(* Includes students or graduates)

"CANNON-PLANE"

AIRACOBRA

Striking 25½" model of the plane that is fast coming to the front as the U. S. A.'s and England's standard pursuit intereceptor. Due to its long projecting nose, it's a perfect high speed flyer. If you prefer, the 2-wheeled Airobonita may also be built from these plans. Master Kit SF-76 ..... **$3.00**



GRUMMAN SKYROCKET

Beautiful 31½" authentic scale model of America's new twin motor 450-mile-per-hour "Terror of the Skies." It's fast. It's spectacular! It's the envy of every modelbuilder! Both motors pull—and how! Its popularity has been instantaneous, so don't delay building it. Strikingly colored silver and yellow. Complete Kit SF-75, only **$3.50**

BOEING P12-E. 22½" Kit SF-8..... **$2.00**

GREAT LAKES SPORT TRAINER. 20" Kit SF-1..... **$2.00**

German ME-109 Messerschmitt

Sleek 24½" model of the Nazi's mass production fighter. Capable of good fast flights. Master Kit SF-74 ..... **$3.00**

DOOLITTLE'S GEE-BEE. 19⅝". Master Kit SF-27 ..... **$2.00**

CURTISS HAWK P6-E. 23⅝" Kit SF-21 ..... **$3.00**

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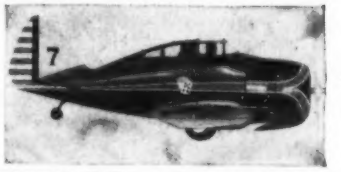
IT'S HUGE! 7 FT. SPAN

CLEVELAND CONDOR Soaring Glider. Span 84". Class D or E. Soars for hours Kit E-5019 ..... **$1.00**

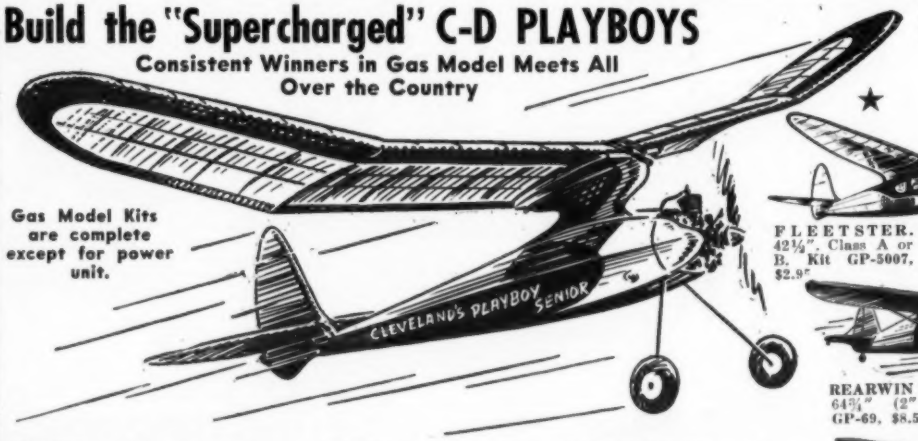
CLEVELAND EAGLET Soaring Glider, Span 48". Class C. Kit E-5018 ..... **50c**



SEVERSKY P-35 Fighter. Latest version is known as "THUNDERBOLT." Kit SF-61 ..... **$2.50**

Build the "Supercharged" C-D PLAYBOYS

Consistent Winners in Gas Model Meets All Over the Country



Gas Model Kits are complete except for power unit.

SENIOR Class C. Huge 80" span. Broke World's record twice in one week. A constant winner everywhere because of its rapid rate of climb. Complete Kit GP-5017 (except power unit) **$4.95**

JUNIOR Class B. Span 54½". (360 sq. in.) Build it, and be the "dark horse" of every meet. Complete Kit GP-5006 (except power unit) **$2.95**

BABY PLAYBOY Class A. For Atom motor or rubber powered. Biggest gas value on market. Span 33". Complete Kit GP-5008 (except power unit) **$1.00**

C-D Gas Models Are Coast to Coast Favorites

STINSON RELIANT 82½" (2" scale.) America's Most Popular Radio Controlled Design. Kit GP-66, $12.50.

FLEETSTER. 42½". Class A or B. Kit GP-5007, $2.95.

VIKING. 48" Class A or B. Kit GP-5020. $1.95.

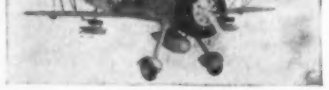
REARWIN SPEEDSTER. 64⅜" (2" scale.) Kit GP-69, $8.50.

ITSY BITSY. 23" Class A. Kit GP-5016. $1.00.

CLOUDSTER. 52". Class "B". Kit GP-5004. $2.95.

There's More Fun, More Education in Building ONE Cleveland Master Model Than DOZENS of Ordinary Models!

All Cleveland SF and D models shown on these two pages are "Master" Models. Engineered to ¾ or ½" scale, they are practically a twin in miniature of the big planes they represent, their prototypes. Yet withal, because of the extremely clear instructions and simplicity of design, they are not difficult to build. Kits are all the new improved type.



CURTISS GOSHAWK F11C-2, Span 23⅝". Kit SF-49 only, **$3.00**

ORDERING INSTRUCTIONS If your dealer can't supply you, send direct with check or money order—cash at your own risk. Minimum orders $1 (to Cuba $20). For shipments outside U. S. add 10% to those going anywhere in Western Hemisphere, U. S. Possessions, and foreign bases. Add 20% to all other countries (remittance must equal U. S. funds). For P. P., Special Delivery, in U. S. only, add 25c; (Ohio residents add 3% Sales Tax). All Prices and kit contents subject to change or cancellation without notice.

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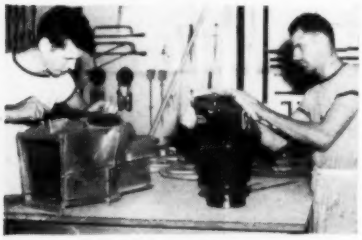
MARTIN BOMBER. 35" Kit D-45. **$2.50**

(Above) The Airacobra after a bit of "surgery" at Langley. Cabin, side radiators and wheel design have been changed, increasing speed



Modelers Bert Deis and Harry Shoaf shape cooling shields on engine cylinders for test in engine lab

Sal Taibi starts work by shaping a 19 foot propeller blade. (Below) Mickey Beitchman at work on a lathe in the instrument department

MODELERS MOLD OUR FIGHTING PLANES

by DAVID JOHNSON

How the model builder serves Uncle Sam at Langley Field Experimental Laboratory

Pictures by **JOE CHEFETZ**

YOUTH is responding to Uncle Sam's call for air power supremacy. They not only man the planes, service and build them, but also perform an important function in airplane design.

At Langley Field, Va., scores of model builders are busily engaged in various phases of modeling for the government; young men who have achieved recognition from their government for their valuable contributions to scientific research in designing more powerful ships.

They are the same "kids" who started "fooling around" with model planes; who spent long hours over drafting boards doping out theories and practical designs. They are the same boys who worked out the "bugs" in advance and waited patiently for small dabs of cement to dry; the very same who progressed from simple rubber driven craft to the remarkable gasoline powered model planes of today.

They are now craftsmen known as Under Aircraft Modelmakers; civil service workers employed with the National Advisory Committee for Aeronautics in its endeavor to keep our country's air power superior in every respect. Their skill has been displayed in many branches of model building, the variety and type of work depending largely upon individual preference and ability.

Many young men have found sheet metal work, wind-tunnel modeling, drafting, instrument making and repair, more suitable to their talents than solely model making. However, almost all sections of the NACA has a model maker personnel.

Employment with the NACA's Under Aircraft Modelmaker division comes under the jurisdiction of the U.S. Civil Service through competitive examinations for Trades and Skilled Occupations. Entrance salary is $1260 a year with rapid promotions as skill and usefulness are manifested. Duties are under the direct supervision of experts who give progressive training in wind-tunnel and dynamic model construction. Modelers are also taught to handle cabinet and model making tools and perform related works as required.

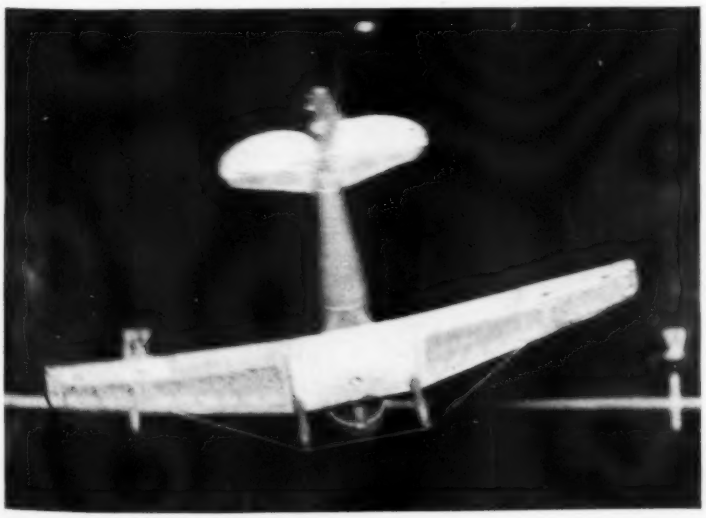
The qualifications necessary to join these ranks require a resident airplane mechanic's course of at least six months at a government approved school which must have included training in model making to exact scale.

Or (1) experience on construction and

(Continued on page 57)

(Above) An early model of Bell Airacobra before changes, indicated by tests, were made in cabin radiator vents and landing gear

A Republic fighter model, altered many times for use in free flight tunnel. (Below) A test model in the free flight tunnel recovers from a spin



Fritz Breisch adjusts strain gauges on a dural test section. Note wrinkles in web due to overload

Modelplane builders shape a model of a flyingboat hull for test in the hydro tank. (Below) Jesse Davidson with free flight tunnel model. In background is the blower fan and moving picture camera to record the test flight

SKY SCOUTS

Learn to spot enemy planes and help defend America

LESSON 3

MANY young aviation enthusiasts, too young for the armed services, are most anxious to serve their country in some way during these critical times.

Many have looked in vain to do something useful in this respect, some way in which they can use their knowledge of aircraft. Most model fans have intimate knowledge of various types of planes and would be most useful as "spotters" during raids. MODEL AIRPLANE NEWS wishes to bring this to the attention of the Office of Civilian Defense in an impressive manner; consequently the States Sky Scouts Corps has been formed. All young men interested in aviation throughout the country are eligible.

The purpose of the organization is to make all members proficient in detecting various types of aircraft and to qualify them to act as spotters during emergencies. When there are several qualified Scouts in various communities each will be notified of the names of the others, so that they may organize into a unit. They then will be referred to the head of the local national spotters organization. This organization will also be given the names of all qualified Sky Scouts in the community.

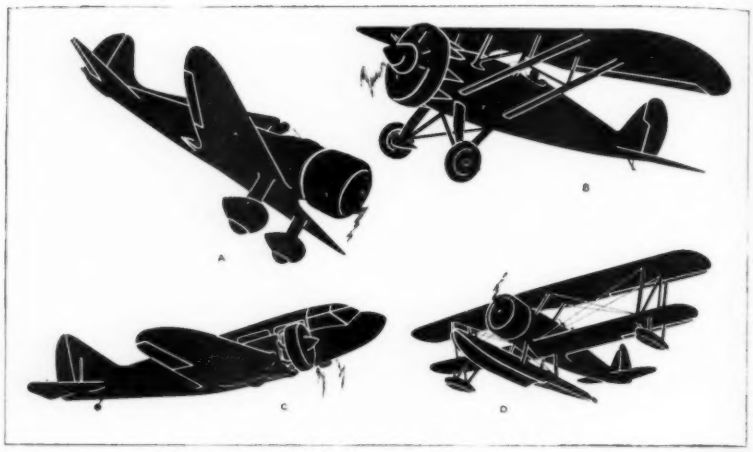
In this way spotters with intimate knowledge of aircraft who can act efficiently will be called to the attention of the proper authorities throughout the nation.

It is a simple matter to become a Scout: each month MODEL AIRPLANE NEWS is printing four silhouette views of enemy aircraft. These should be studied carefully and the characteristics noted. Prospective Scouts then should fill in their name and address on the blank at the end of this article, and write a letter naming and describing the planes shown in silhouette.

In this article the names are given and the distinctive characteristics described. Read over all of the data carefully before writing the names on the blank. When the first two installments have been carefully read and the blank filled in and sent to this office by any Scout, a silver pin will be available to him, at cost. When he has completed twelve installments in the same manner a gold pin will be available and he will be registered as a full-fledged Sky Scout.

Occasionally with this article three-view silhouettes similar to the one given here will be presented so that modelers will be able to build scale models of various enemy aircraft. These can be hung up close to the ceiling in their room, where they may be seen while lying in bed, or relaxing during odd moments. This will fix in the mind of the Scout the general appearance of the ship in flight. After a number of models have been made, forming a complete fleet, it will also serve as a unique and

(Continued on page 38)



Below is a three view of the Kawanishi 95 seaplane from which solid scale models may be built. By suspending a group of these from the ceiling of your room their distinctive features will appear in a realistic manner

THE MULVIHILL TROPHY WINNER

How you can build the high-time stick model winner of the 1941 Nationals—a consistent duration model in still air or in thermals

by **RAY SMITH**

EARLY in the spring of 1941 the third in a series of 200 square inch stick models developed by Bob Johnson won the Mulvihill Trophy. Its principal features are its 7 to 1 aspect ratio wing, strong construction, and extreme simplicity. This last factor is very important in any contest model, because it not only facilitates building but also permits quick repairs on the "field of battle."

The first model in this series was built in 1940 and was lost two days after completion. It was a very simple job, with a freewheeling propeller and could fly three minutes without thermal currents assistance! The second model was somewhat more streamlined, with folding propeller and other refinements. This job took first place at our annual club invitational meet in 1940, with flights averaging 2:18 on a windy, overcast day. However, it proved that the model could do 3:15 in still air. A short time later, with only one flight, it took fourth place in another contest.

The third in this series, the Mulvihill Trophy winner, has a very low aspect ratio wing. The efficiency of this wing may be questioned, but it has several advantages, such as, lightweight, stronger, easier construction and less susceptibility to warping. It glides slowly at a ratio of 7 to 1, giving the ship a low sinking speed.

On its maiden voyage the model was lost after four minutes; several days later it was found about 9 miles from its starting point. The following Sunday, two flights were made, one for 10:04 and the other for 6:33, after which it disappeared from sight.

Another ship was completed in time for the Chicago Spring Record Trials. However, after a test flight of 16:04, it was damaged on landing. It was repaired and entered in the annual meet where it flew out of sight after 7:22, receiving fourth place. Ray Smith built another in time to enter it in the Nationals, where it won the Mulvihill and C. W. Rogers Trophies. This model averaged a total time of 1184.5 seconds and a long single flight of 15:26. Bob Johnson received eighth place in the Junior Division with the same design. In all, four models have been made from this design; six out of sight flights were made and all the ships were lost except one.

CONSTRUCTION—Before starting construction the plans must be scaled to full size. Note that the drawings are scaled 1/4" = 1 inch. The plan may be enlarged in one of three ways: photostating, laying it off with a divider, or using a rule. Spread a sheet of wax paper over the drawing to prevent cement from ruining the plans. If you use the grades of wood suggested in this article, your model will probably weigh less than 6 ozs. Make up the additional weight required by adding more rubber.

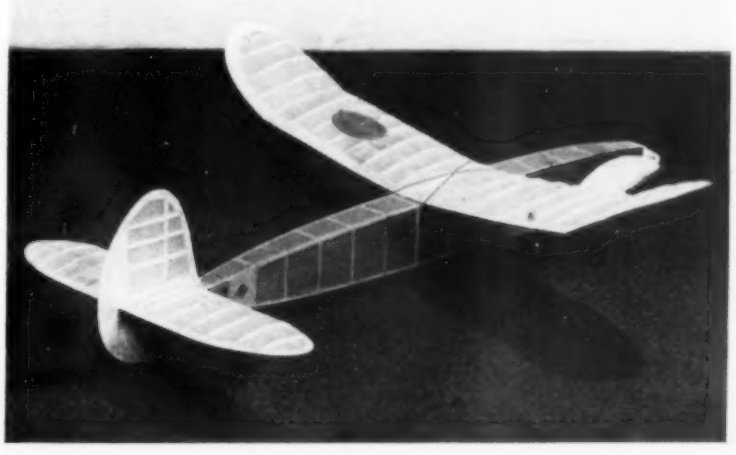
FUSELAGE—Pin the 1/8" sq. hard balsa longerons to the fuselage outline of the full scale layout, being careful not to split the wood. Cut the cross braces and cement them into place. After allowing sufficient time for drying, build the other side directly on top of the first. This insures perfect alignment. Remove the completed sides from the plan and join them together, as shown in the top view of the plan. It is to your best advantage to work slowly and carefully. Hard balsa fill-ins are added to nose and tail, as illustrated, and the brass plate is inserted for the rear hook.

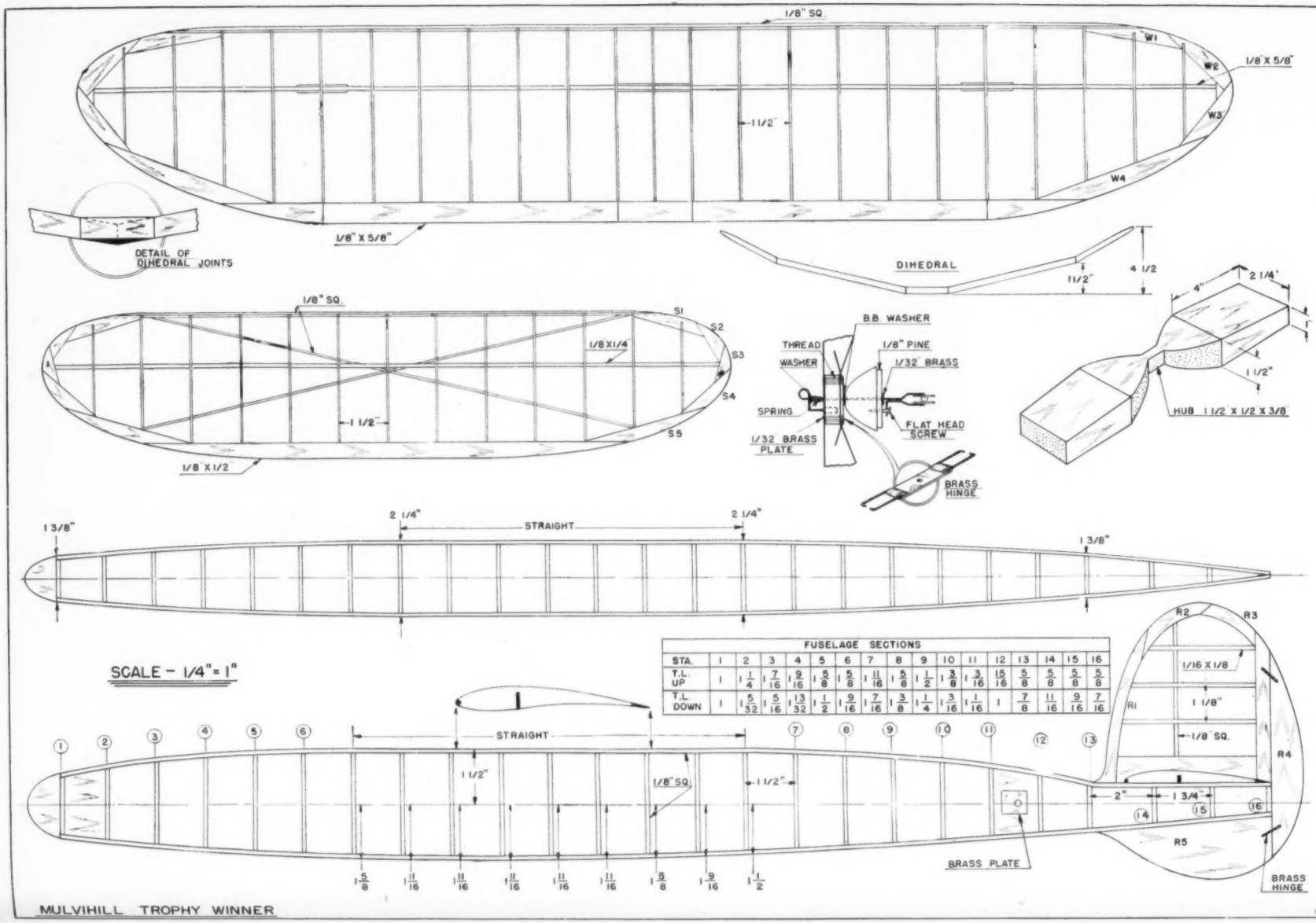
WING CONSTRUCTION—Cut 23 ribs from 1/16" light quarter-grain stock. Pin the ribs together and sandpaper them as one unit to insure uniformity. Then cut all notches with great care. Cut wing tips from 1/8" sheet balsa according to full size patterns.

The wing is now ready for assembly. Pin the main spar and trailing edge onto the drawing in their proper positions. The trailing edge should be cut from very light quarter-grain 1/8" sheet. However, at the center section it should be very hard quar-

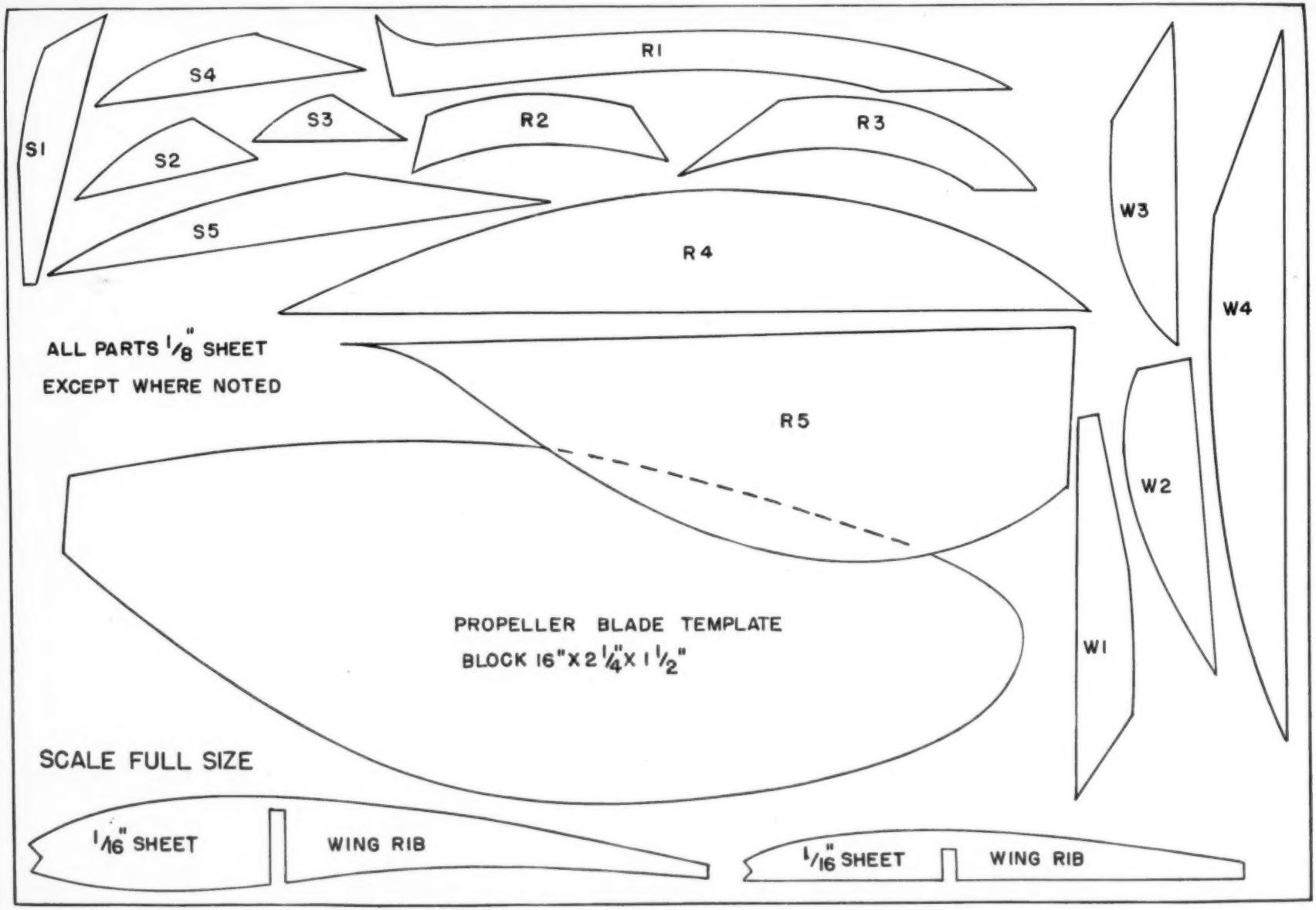
(Continued on page 53)

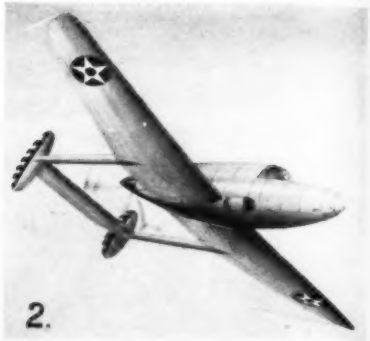
Two views of the sturdy, compact winner, propeller folded; top, with trophies it has won




1/8" SQ.
W1
W2
W3
W4
1/8" X 5/8"
1 1/2"
1/8" X 5/8"
DETAIL OF DIHEDRAL JOINTS
DIHEDRAL
1 1/2"
4 1/2
1/8" SQ.
S1
S2
S3
S4
S5
1/8 X 1/4
1 1/2"
1/8" X 1/2"
B.B. WASHER
THREAD
WASHER
SPRING
1/32 BRASS PLATE
1/8" PINE
1/32" BRASS
FLAT HEAD SCREW
BRASS HINGE
4"
2 1/4"
1 1/2"
HUB 1 1/2 X 1/2 X 3/8
1 3/8"
2 1/4"
STRAIGHT
2 1/4"
1 3/8"
SCALE - 1/4" = 1"
FUSELAGE SECTIONS
STA. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
T.L. UP 1 1/4 7/16 9/16 5/8 5/8 11/16 5/8 1/2 3/8 3/16 15/16 5/8 5/8 5/8 5/8
T.L. DOWN 1 5/32 5/16 13/32 1/2 9/16 7/16 3/8 1/4 3/16 1/16 1 7/8 11/16 9/16 7/16
1 2 3 4 5 6
STRAIGHT
7 8 9 10 11 12 13
1 1/2"
1/8" SQ.
1 1/2"
5/8 11/16 11/16 11/16 11/16 11/16 5/8 9/16 1/2
2"
1 3/4"
14 15 16
BRASS PLATE
R1
R2
R3
R4
R5
1/16 X 1/8
1 1/8"
1/8" SQ.
BRASS HINGE
MULVIHILL TROPHY WINNER
A

MULVIHILL TROPHY WINNER





FIGHTING PLANES OF THE FUTURE

Artists' impressions of planes with design features now being considered by engineers

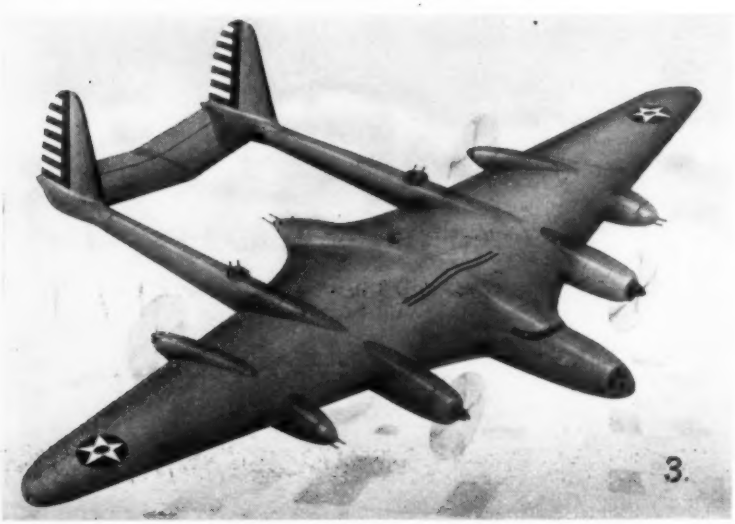
UNDER stimulus of war, airplane designers' imaginations are exploring all fields of design, for improved performance, higher speeds, climb, etc. Designs formerly considered fantastic are now being given serious consideration.

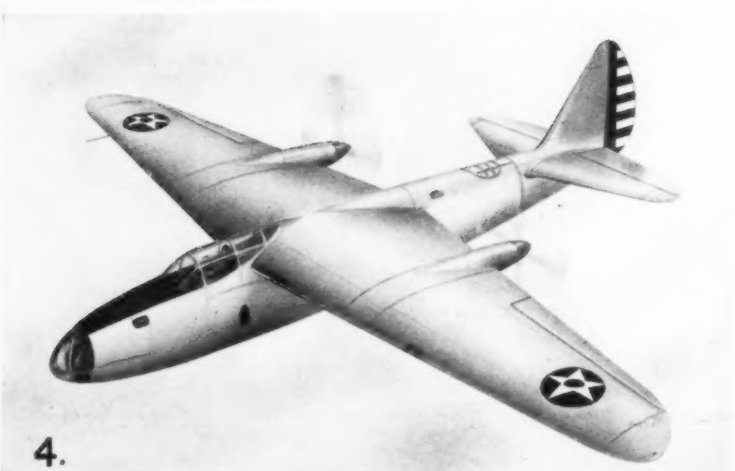
The pictures on this page are photographs of plane drawings depicting the trend. Apparently, some of these designers are either looking into the model field or have been model builders at one time or another.

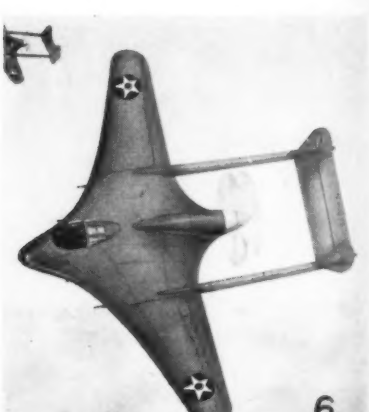
For instance, examine plane 1. It is hard to conceive a designer, raised in the orthodox school since the last world war, giving this high-speed canard pusher pursuit ship the slightest consideration as a practical design. Nevertheless engineers are now wandering far afield, investigating every high performance possibility.

To the model builder familiar with this

(Continued on page 38)







SUPER FLYING FORTRESS

Boeing B17-E, the world's most efficient bomber, is now carrying the war to Japan

The plane on the cover

by ROBERT McLARREN

A FOREST, a church and an accident built the mighty Boeing Flying Fortress bombers, today wreaking such havoc on the enemies of democracy and a free way of life. For the forest of the great Pacific Northwest gave young William E. Boeing of Seattle, Washington, a large private fortune while in his early thirties and made him renowned as one of the pioneer lumbermen of Washington. Yes, Bill Boeing was a wealthy man long before he ever thought of flying, or building airplanes.

Another pioneer, Glenn L. Martin, was building his first airplane in an abandoned church in Santa Ana, California, while still in his 'teens. With Boeing's discovered interest in aviation and Martin's growing designs and shops in California it was inevitable that the two should meet in Southern California in the Spring of 1915.

At this time Martin was producing seaplane designs similar to the first machine in which he had become the first man to fly from the mainland to impenetrable Catalina Island, now a garden-spot resort. In those days buying an airplane included a course of instruction in the art of its operation and Martin taught Boeing all that was known at the time and the timber-man winged northward,—a pilot!

Then the accident. Soon after came the inevitable crash and the even more inevitable "wash out" of the machine. A lesser man might have abandoned not only the wreckage but the flying career, but Bill Boeing decided he could repair the plane himself on the theory that a self-respecting lumberman could handle anything made out of wood!

After putting the Martin back in shape, Boeing decided, further, that there should be nothing very complicated about building an airplane. And build an airplane he did, the B&W seaplane, with the aid of J. C. Foley and E. N. Gott. On July 15th, 1916, Pacific Aero Products was formed and several seaplanes were built to Navy specifications, largely from photographs and meager engineering data. Early in 1917 the Boeing Airplane Company moved into a new building at Georgetown Station just south of Seattle. At this time two young men were taken into the company, C. L. Egtvedt, as stress analyst, and P. G. Johnson as engineer. These two gentlemen are now Chairmen and President, respectively, of the world's biggest bomber factory!

The first World War found Boeing ready, willing and capable and large numbers of Model C Navy trainers and HS-2L flying boats were completed, the latter the largest airplane ever built up to that time.

Then came the post-war slump and Boeing's lumber sense pulled his firm through: building furniture! But airplane design was continued resulting in the B-1, the first original Boeing design, a flying-boat that hung up a record total of 350,000 miles in seven years wearing out 6 different engines! It was the nation's first privately-owned airmail plane and the first plane to fly an international mail route, Seattle to Vancouver, B.C., Canada.

At this time the first Boeing pursuit was designed, a type that created a world-famous name. Hundreds of Boeing single seater pursuits were manufactured for both U.S. Army and Navy air services, most famous of which were the P-12 Army series, F4B Navy series, and the renown P-*26* "Peashooter" monoplane pursuits still in use by the Army Air Corps. In lesser quantities have appeared the PW-9 Army series and FB and F2B Navy fighters, plus a baker's dozen of experimental types.

But not all of Boeing's fame was in the military field, for equally famous are the 40-B4 mail carrier, 80-A tri-motor transport and pioneer Model 247, the world's first high-speed twin engine airliner, which built powerful United Airlines' reputation for speed and dependability.

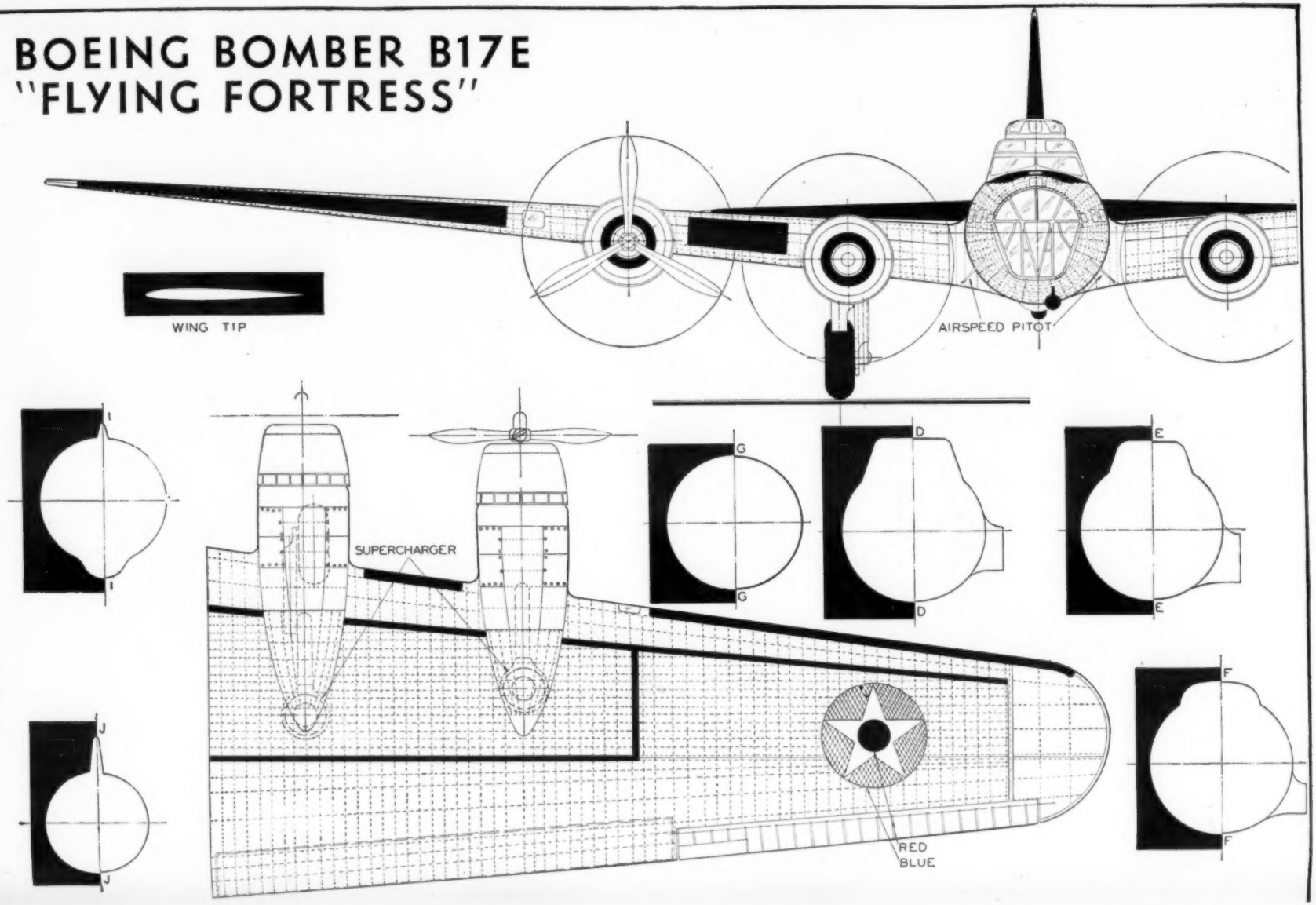
Boeing entered the air transport field in 1927 with the Boeing Air Transport Company, later the "Boeing System" comprising Pacific Air Transport and National Air Transport, later absorbed into United Airlines and subsequently into the huge United Aircraft organization now controlling the destinies of Boeing Aircraft, United Airlines, Pratt & Whitney Aircraft, Hamilton Standard Propellers, Vought-Sikorsky Aircraft, United Airports, Stearman Aircraft and half-a-dozen lesser accessory firms. Truly a gigantic American aviation holding corporation!

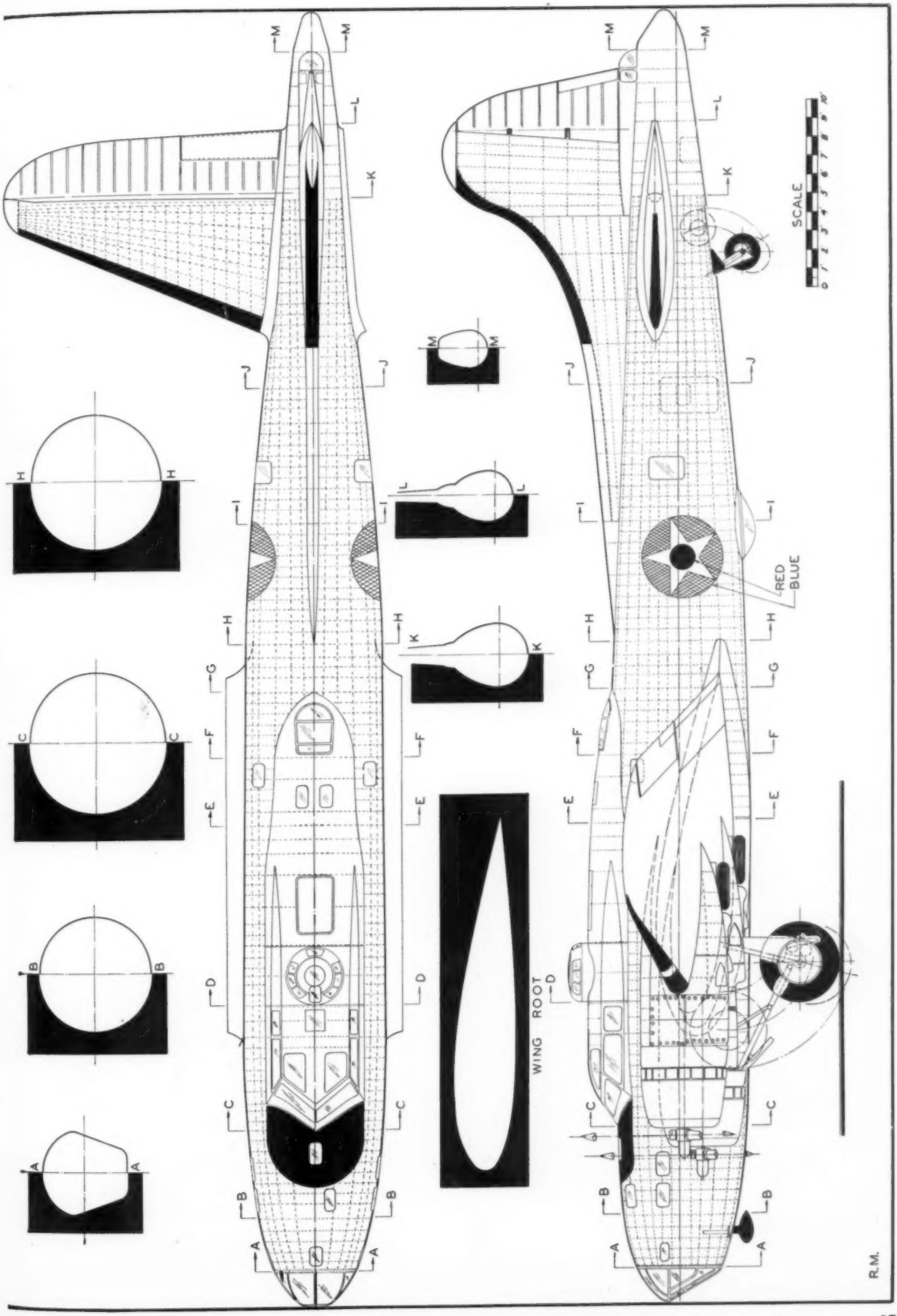
In 1935 Boeing announced a policy of "four engine aircraft" exclusively and since that time has pursued it through several outstanding and superior flying machines. The Model 299 became the Army Air Corps' widely publicized "Flying Fortress"; Model 307 became the equally famed "Stratoliner," world's first airliner operating on a scheduled route with a pressurized cabin; and model 314 "Clipper" which has achieved an enviable reputation in use by Pan American Airways on both trans-Atlantic and trans-Pacific aerial routes.

It is absorbing to study the geneology of a flying machine and the Flying Fortress was conceived in 1928 when the Boeing "Monomail" first flew as one of the earliest true monocoque fuselage-full

(Continued on page 44)

BOEING BOMBER B17E
"FLYING FORTRESS"



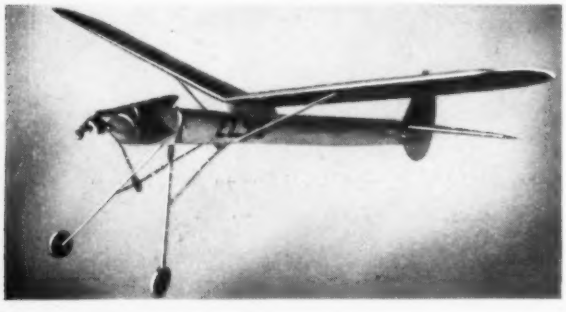

SCALE
RED
BLUE
WING ROOT
R.M.

5. Third annual Lock Raven gas model contest in full swing

6. Jack Anderson and his first gas model

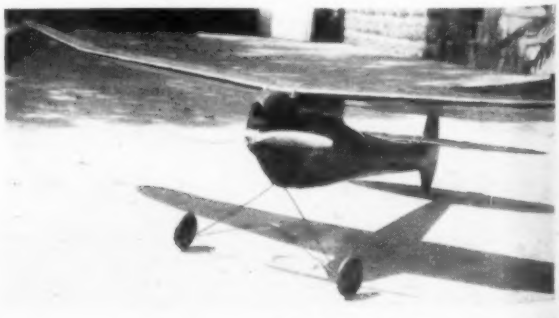
7. Gavito Brothers, winners of the Nat. Federation of Aeromodelers of Mexico Contest

8. These detail scale World War I planes are the envy of all who see them. (Below) 9. A unique R.O.G. stick model that has flown for two minutes



10. Pvt. Francis Munson and his Fireball create a lot of commotion at Fort Bragg

11. Not a "large" plane, just a realistic model Lockheed Electra by Robert Wynne (Below) 12. Chester Morris, gas job with cleverly designed engine cowl



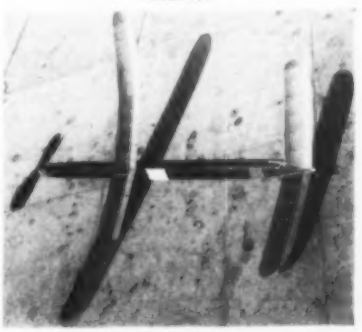
AIR WAYS

News of models, builders and activities from all parts of the world

(Above) 1. Ready for a skyward leap is this gas job built by Frank McElwee

2. Closeup showing cabin details of Hugo Gooderum Jr.'s Rearwin Speedster

3. This is really unique, a scale World War I Sopwith Camel gas model. (Below) 4. A first place winner in many contests and it has flown as long as 32 minutes



Model Builders: Read this vitally important message!

ABOUT ten years ago Stalin and Hitler undertook to prepare for total air war; they foresaw that he who controlled the air would win battles.

In a search for a training medium for the thousands of young men who would form the backbone of the aviation industry and airforces, they both chose the model airplane; recognizing it as a scientific instrument of instruction rather than a "toy." They made nation-wide designing, building and flying compulsory. Thus they implanted in youthful minds the fundamental principles of aerodynamics, principles of flight, forms of structure, nomenclature and the "feel" of planes in free flight. This knowledge became second nature and upon it the great airforces of Russia and Germany were built.

No such governmental program has been instituted in the United States, one of the most ingenious nations in the world. However this ingenuity springs from the individual and not from government in this latter case, and it was the individual that heeded the patriotic call of necessity. Hundreds of leaders familiar with aerodynamic principles undertook to train young America by means of model airplanes.

This program was initiated about 10 years ago in a serious manner. Since that time thousands of young men have participated individually or in club groups in model aviation. Thousands who have had the urge to fly, to build their own planes and who had ingenious ideas but who had not the money, time or the place to experiment with full size planes, found expression for their genius in miniature.

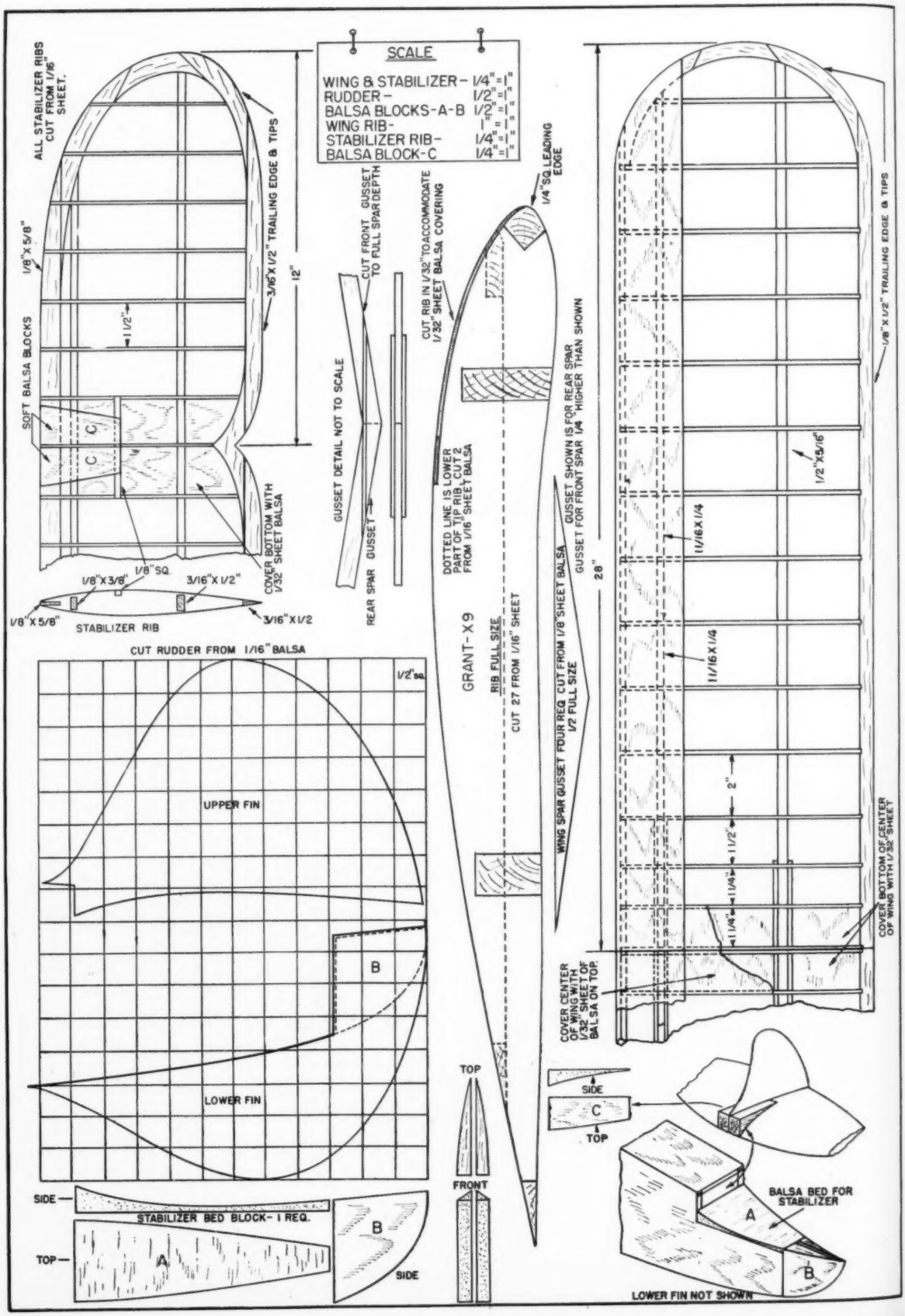
Flights of several hours and hundreds of miles were made during this training period. Thousands trained their hands to deftly form complicated structures; in fact it was an outlet for young America's irrepressible imagination, until today this training has provided nearly one million young men with basic training and knowledge of every phase of aviation. Thousands of these now are in our factories, in executive positions, or in the armed forces. The government has been saved literally millions of dollars and much precious time because of this; time that without this training would have to be spent to give our young men the fundamental knowledge which they now possess.

All of this looks very much like a pat on the back, and in fact every participating model builder deserves immeasurable credit. However the fight is just beginning, for today, after this system of training has been built up and organized on a nation-wide basis, after manufacturers have spent millions of dollars to provide the means for this training, there is great danger that now it will be cut off entirely and the future training of young men in this manner eliminated. The government, not yet realizing what has been done or the value they are receiving from model activities, threatens to cut off the insignificant supply of material required by model builders. Not realizing it, they are cutting their own throat.

The question now is, do all model airplane builders wish to cease this activity or do they wish to carry it on as a pleasure and patriotic duty? It must be carried on! In fact the future of this nation actually depends upon it, for there is no substitute of equal value that the government might offer.

Model leaders have followed up every conceivable line of thought and have taken every action possible to induce the government to allocate the small quantity of material necessary to carry on this great work —but have received no affirmative reply

(Continued on page 31)


SCALE
WING & STABILIZER - 1/4"
RUDDER - 1/2"
BALSA BLOCKS-A-B 1/2"
WING RIB - 1"
STABILIZER RIB - 1/4"
BALSA BLOCK-C 1/4"
ALL STABILIZER RIBS CUT FROM 1/16" SHEET.
1/8"X 5/8"
SOFT BALSA BLOCKS
1 1/2"
3/16"X 1/2" TRAILING EDGE & TIPS
12"
COVER BOTTOM WITH 1/32" SHEET BALSA
1/8"X3/8"
1/8"SQ
3/16"X 1/2"
1/8"X 5/8"
3/16"X 1/2"
STABILIZER RIB
GUSSET DETAIL NOT TO SCALE
CUT FRONT GUSSET TO FULL SPAR DEPTH
REAR SPAR GUSSET
CUT RIB IN 1/32" TO ACCOMMODATE 1/32" SHEET BALSA COVERING
1/4"SQ LEADING EDGE
DOTTED LINE IS LOWER PART OF TIP RIB, CUT 2 FROM 1/16" SHEET BALSA
GRANT-X9
RIB FULL SIZE
CUT 27 FROM 1/16" SHEET
WING SPAR GUSSET FOUR REQ. CUT FROM 1/8" SHEET BALSA
1/2 FULL SIZE
GUSSET SHOWN IS FOR REAR SPAR
GUSSET FOR FRONT SPAR 1/4" HIGHER THAN SHOWN
28"
1/8"X 1/2" TRAILING EDGE & TIPS
1/2"X5/16"
1 1/16X 1/4
1 1/16X 1/4
2"
1 1/2"
1 1/4"
1 1/4"
COVER BOTTOM OF CENTER OF WING WITH 1/32" SHEET
COVER CENTER OF WING WITH 1/32" SHEET OF BALSA ON TOP.
CUT RUDDER FROM 1/16" BALSA
1/2"sq.
UPPER FIN
B
LOWER FIN
SIDE
STABILIZER BED BLOCK- 1 REQ.
TOP
A
B
SIDE
TOP
FRONT
SIDE
C
TOP
BALSA BED FOR STABILIZER
A
B
LOWER FIN NOT SHOWN

MODEL DESIGNING SIMPLIFIED

Designing wing and tail surfaces of a gas model

by CHARLES HAMPSON GRANT

ARTICLE 17

IN THE last article, No. 16 of this series, the general arrangement of this gas model and fuselage structural details were designed. Now the arrangement and details of the wing and tail surfaces must be worked out.

The first consideration is simplicity, for the simpler the structure the lighter it is and the easier to assemble. The second thing that must be kept in mind is the stresses it must withstand.

From the standpoint of simplicity, make the structure with as few parts as possible, arranging them so that the joints will be strong and the least amount of material is necessary. The arrangement of parts must also conform to the stresses involved so the builder should have some idea of how the stresses act and their intensity so the parts can be placed to properly withstand them.

The simplest wing that can be built has two main spars with transverse ribs mounted on them at given intervals from root to tips. In order to prevent sagging of the covering between ribs at the nose and to retain correct airfoil shape, a thin strip of sheet balsa should be cemented from the leading edge over the top of the ribs and extending backward about 1/3 the chord length.

A balsa leading edge strip is necessary, of which there are various types. It may be made of thin sheet, square cross section or half-rounded. The square cross section will be used because this type makes it easier to assemble the wing and provides sufficient gluing surface for the sheet leading edge covering.

The square leading edge shown on the drawing is inserted to form a diamond, with the diagonals vertical and horizontal. When the ribs are notched in a "V" this strip fits neatly into place and provides plenty of gluing area. When the wing is completely assembled the sharp corner of the strip may be rounded to give correct form. Trailing edge strips and tip edges should be included; the former should be thick enough so it will not warp under tension of the covering when doped. Often when this strip is very thin it does not retain its shape and causes either wash-in or wash-out of the wing.

Spars should be located approximately equal distance on either side of the 40%-point of the chord. The drawing indicates exact placement. The space between ribs usually is about 1/4 of chord length; in this case it will be 2 inches. Start spacing them from the wing tip; if at the center these spaces do not come out evenly, space the last 2 or 3 ribs closer together, as the stresses at this point are greatest.

There are several methods of attaching the ribs on the spars. Sometimes the spars run the full depth of the wing from upper to lower surface. This requires a rib cut in 3 sections; the nose section in front of the front spar, the middle section between the spars and the trailing edge to the rear of the rear spar, which is quite difficult to assemble without the wing section being distorted. The simplest method is to mount one piece ribs on spars, having less depth than the ribs. Then, when assembled, the lower edge of both spars should be flush with the bottom edge of the ribs, leaving a small edge of the rib passing over each spar. This type of rib may be cut out in one piece and spar slots cut into it at the proper places. The rib then may be assembled and glued in place as one unit.

Designing the tip is often a problem; some builders carve down the upper surface to meet the lower. The simplest method, however, is to continue the upper surface straight out to the tips, slanting up the lower surface to meet it. The shape or curve of the tip determines the point at which the lower surface starts to slant upward; in this case it is the second rib from the tip, the last rib being a short one.

The wing is to have a straight dihedral from center to tip; the crease therefore will be at the center. It is simplest to make the wing in 2 halves and then join these together, cementing the 2 inner ribs face to face and splicing the spars of the wing at correct dihedral by cementing gussets to front and rear faces of both spars.

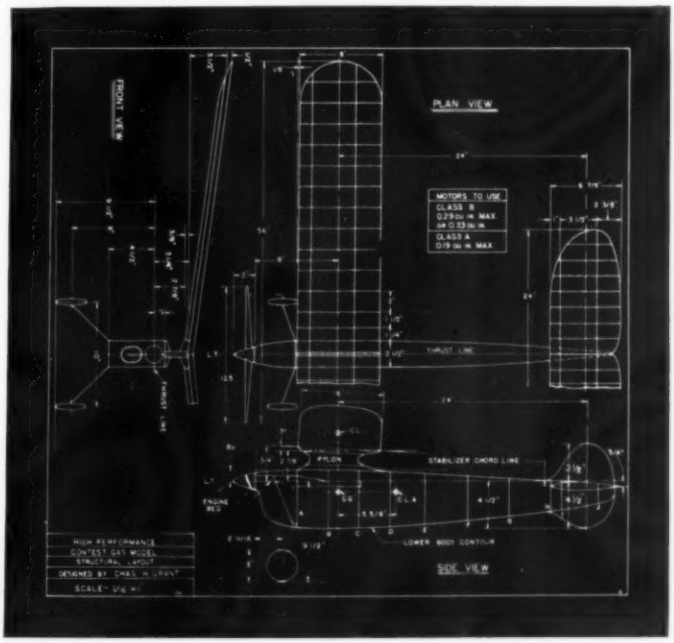
When finished, the wing will rest on the wing pylon and be held in place by a rubber strap hooked over the pylon extension pins front and rear.

This strap will pass directly over the center of the wing. To create proper bearing surface and prevent the strap from cutting into the wing, the 2 center panels between ribs 1 and 2 should be covered with sheet balsa top and bottom.

The stabilizer should be similarly constructed; however, it is unnecessary to have a leading edge wood covering. The general structure should be composed of 2 main stringers, a leading and trailing edge with transverse ribs. Here the stringers can pass directly through holes in the rib as shown on the drawing, or the rib may be notched upward from the bottom and then slipped over the spars when assembling them. The top and lower surfaces should be slanted down equally at the tips; thus the leading, trailing edges and tips are in the same horizontal plane.

Now let us consider the required size of the parts. This depends upon the stresses developed in the structure under all conditions of operation. The greatest stresses are due to the air pressure on the wing supporting the weight at the center. In other words, there is a concentrated load at the center of the wing with approximately equal upward pressure along its span. The least pressure on each wing is equal to half the weight of the airplane; consequently the wing should carry the load with no sign of breaking when supported at its center point—in this case at about the 7th rib from center on each side. However, in dives and during every flight maneuver, greater pressure than the full airplane weight is ex-

(Continued on page 34)



ACADEMY OF MODEL AERONAUTICS

(A Division of the National Aeronautic Association)

Official Model Airplane News

Listen to
N.A.A.'S AIR YOUTH
FOR DEFENSE!
Saturday 4:30 P.M. E.W.T.
Red Net Work
N. B. C.

Aviation Education in the Public Schools

Immediate steps to initiate courses of aviation education in the public schools of your community and state can help build American air power.

Normally, such an undertaking would be considered carefully for many months. But the fast winning of the war demands that education, like all other activities, be geared to the wartime tempo.

N.A.A. therefore urges that you set out to begin courses at once in the *coming semester*. Here are the benefits—

A. Emergency.

1. Pre-training for wartime work as:
   a. Airplane pilots and mechanics to serve in the military and ferrying services.
   b. Aircraft factory workers.
   c. Workers in other defense industries.
2. Civilian defense service such as:
   a. Making of scale models to train military and civil defense personnel in aircraft identification.
   b. Enrollment of young people 18 and over in the Aircraft Warning Service and other civil defense units.
   c. Building community interest in aviation by youth projects.

B. Long-range.

1. General training for life in a post-war world which will undergo rapid changes through the fast development of air commerce and private flying.
2. Education in sciences, such as physics, aerodynamics, and meteorology, where studies are greatly stimulated by the interest generated by aviation courses.
3. Experience in handicraft; learning by doing.
4. Morale building. Juvenile delinquency has been greatly reduced in cities which have instituted aviation courses.

Focus On Pre-Draft Ages

Courses should be planned especially for young men and women between 16 and 19 in high schools and junior high schools—just below the ages when they may be called into military service or can work in war industries.

Younger students should be given opportunities if facilities permit. Russia and Germany built their air power over a period of years through mass movements which carried their young people step by step from model building to full-scale flying. This has been done in the United States largely by volunteer movements with little public encouragement and should now have the backing of the schools to prepare either for a long war or for the peacetime future of aviation

But the object now must be to concentrate on the age groups which can offer effective war work *soon*.

Intensely Practical

That aviation training in the public schools is a practical means of preparing for defense work in aviation is attested by the following statements sent to the National Aeronautic Association by aircraft executives.

"The building of flying model airplanes is of great value in acquainting many young men with the principles of airplane design, construction, and operation in a manner which would not be available to them otherwise. Perhaps 50% of the 600 now in our Engineering Department are familiar by experience and have benefited greatly through model airplane construction."—G. A. Page, Chief Engineer, Curtiss Wright Corp., Airplane Division.

"It has been our experience that your men who have been interested in model building have very often turned out to be excellent aircraft mechanics. A considerable number of the men in our employ illustrate the truth of this."—Paul S. Gilbert, Personnel Division, Grumman Aircraft Engineering Corp.

"Model airplane building is the backbone of the airplane industry today."—James J. Smiley, Jr., President, Frankfort Sailplane Co.

Many additional endorsements could be offered.

Preferably, work in junior aircraft courses should be followed up by instruction in an airplane pilot or mechanic school approved by the Civil Aeronautics Administration. In some of the largest aviation schools, as many as 75% of the students became interested in aviation careers by building and flying model planes.

But many workers now employed in building and servicing planes had no other aviation training than model building, which has helped them serve their country well.

Types of Courses Needed

The course here recommended for immediate action involves the building and flying of model airplanes under the *industrial arts* departments of primary and secondary schools.

Classroom work of the type required in ground school training of pilots is desirable for those schools ready to undertake it. But it would be difficult in most cases for schools to find or train instructors for an immediate start.

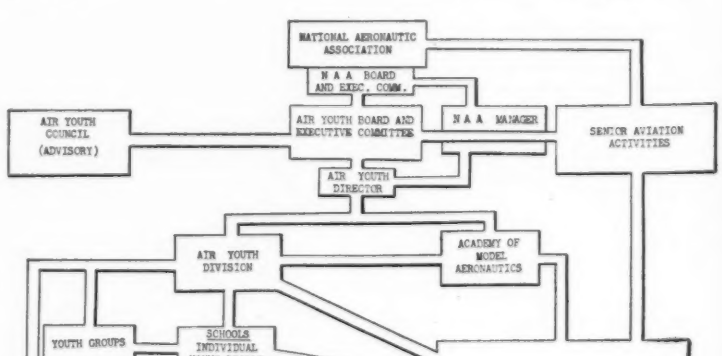
Model building, which affords much supplemental study, can be successfully taught by any competent manual training instructor without previous experience. Expert teachers say that the course virtually teaches itself because of the enthusiasm with which the students take part in work relating to aviation.

Instruction Texts Available

The National Aeronautic Association has prepared a preliminary instruction text on how to set up a model aviation course. This text, prepared for the use of both instructors and students, is sufficient to complete several lessons *without special materials* other than cardboard, etc., which the students can easily procure for themselves.

Further text material, to carry on through the rest of the semester, will be available soon. As this is written, the needs of the model aircraft industry are under consideration by the Office of Production Management. The serious shortage of war materials will dictate some

(Continued on page 34)

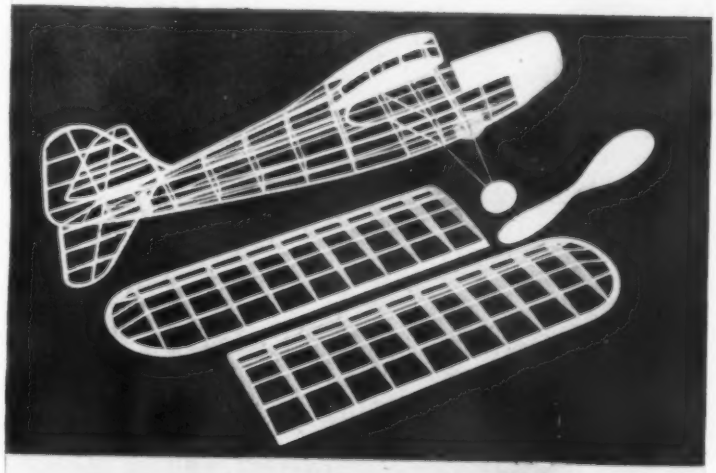


Complete instructions and plans to build and fly the new Taylorcraft U. S. Army cooperation plane

HEDGEHOP WITH THE "GRASSHOPPER"

by **EARL STAHL**

A small scale replica of the Army's latest airplane. Parasol wing and long fuselage make it an excellent contest model. The structure is simple, light and strong



AS THE result of brilliant performance in the war games last summer the Army placed orders with the three largest manufacturers of lightplanes, Piper, Taylorcraft and Aeronca, for a fleet of "aerial jeeps," more popularly known as "grasshoppers."

Operating under simulated war conditions, the "grasshopper fleet" proved that lightplanes are indispensable in modern warfare. Flown by civilian pilots, these planes proved their adaptability for all kinds of observation work, personnel carrying, directing traffic and troop movements, even picking-up and delivering messages, maps, and materials in flight.

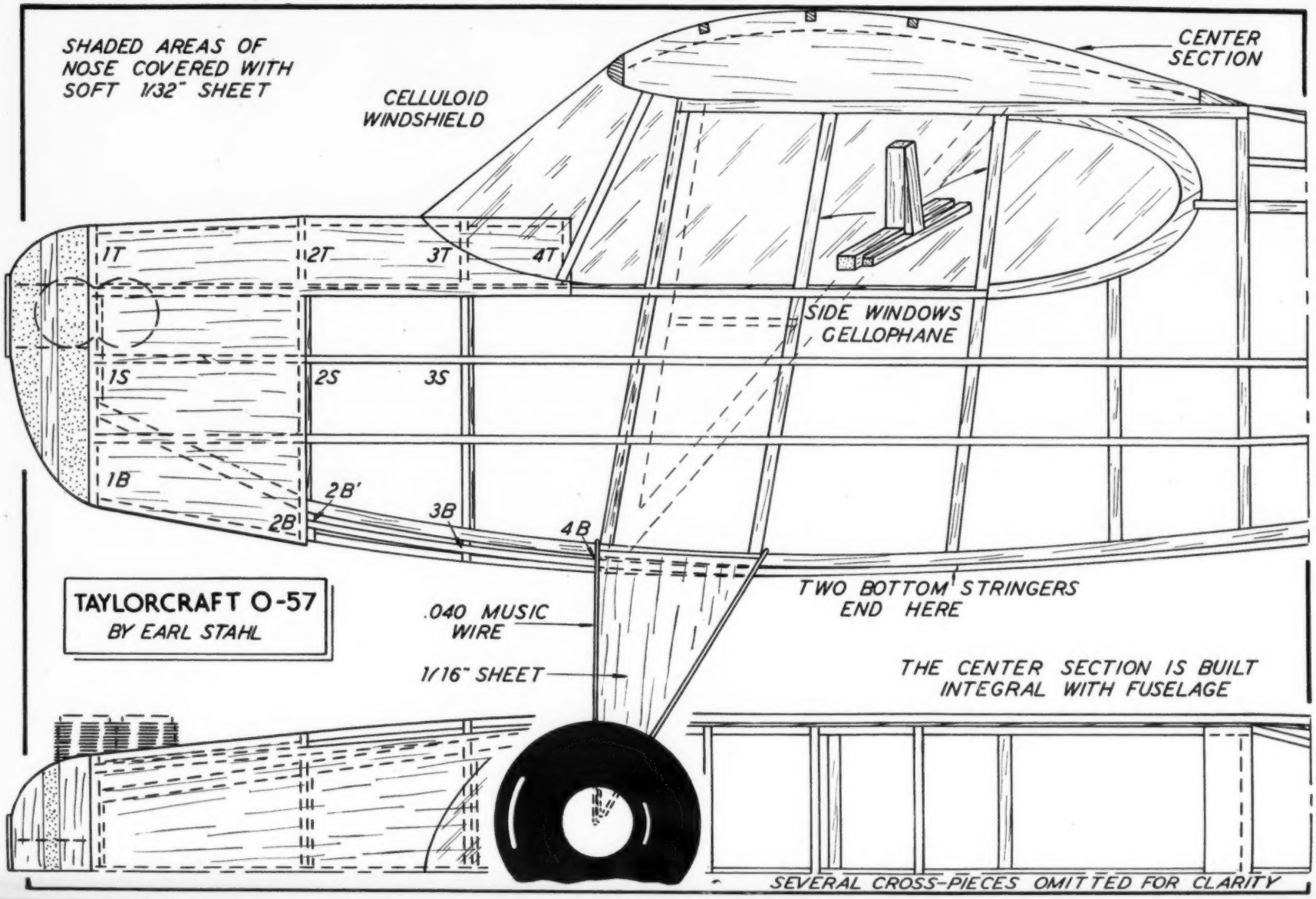
To further prove their value the "grasshoppers" repeatedly flew from seemingly impossible areas. In Louisiana army engineers prepared landing spots measuring a mere 400 ft. long and 100 ft. wide—and without considering wind direction. Obviously larger, faster planes could not use such bases, but these lightplanes in hands of skilled pilots made numerous takeoffs and landings. It was all in a day's work for pilots to land on highways, sometimes in open spaces between moving convoys, to complete a mission or possibly borrow a few gallons of gas. During maneuvers in Texas one pilot made several landings on the up-slope of a high mountain, then taxied around the gravel ledge rim, and took off on the down-slope. Of course there were a few accidents, but they were of a minor nature and quickly repaired. The most serious mishap resulted from a spin as a pilot circled low so he could "Yoo-Hoo" to his girl friend.

"Grasshoppers" used in the war games were identical with ships available to civilians, all being converted tandem trainers powered by Continental 65 hp. engines. The only important additions were radio transmitters and receivers.

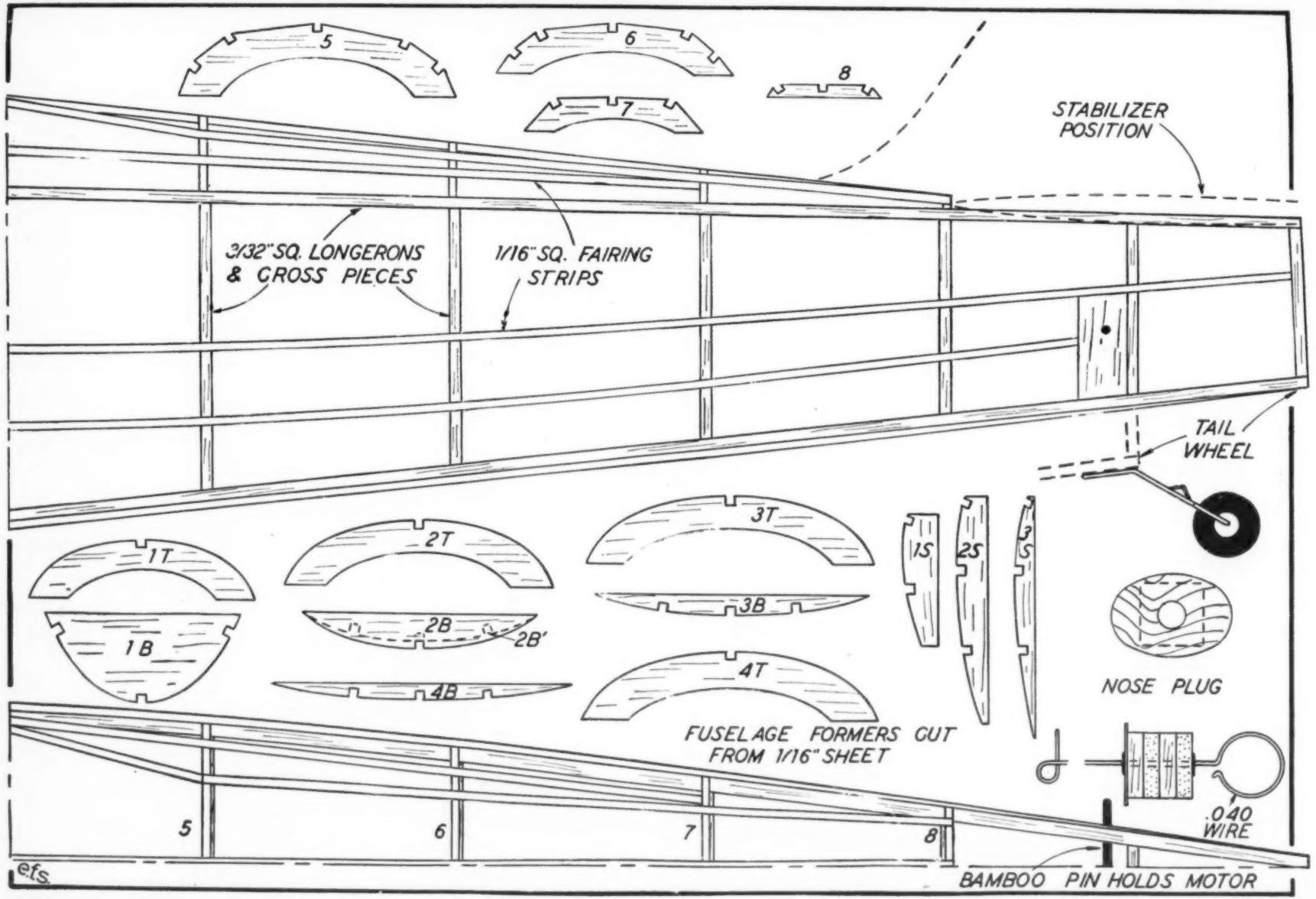
For our model we have selected the Taylorcraft trainer, known in the Army as the 0-57. This plane is similar in appearance, construction and performance to other tandem trainers on the market. Available with Continental, Lycoming or Franklin engines of 65 hp., the commercial version performs as follows: Top speed, 102 m.p.h.; landing speed, 35 m.p.h.; climb 600 ft. per min.; cruising range, 300 miles on 14 gallons of fuel.

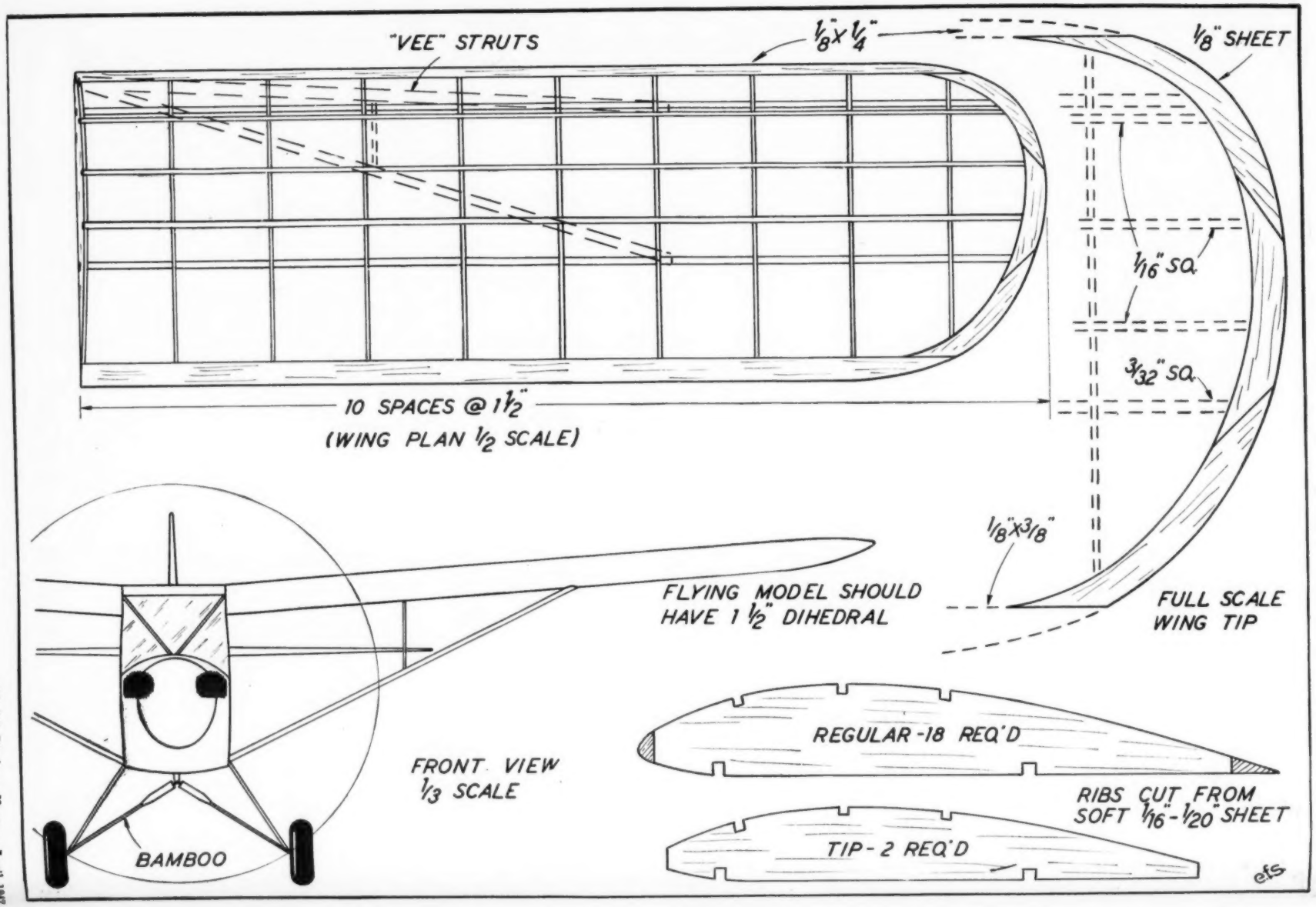
The model has the same fine characteristics as the real ship: construction is easy

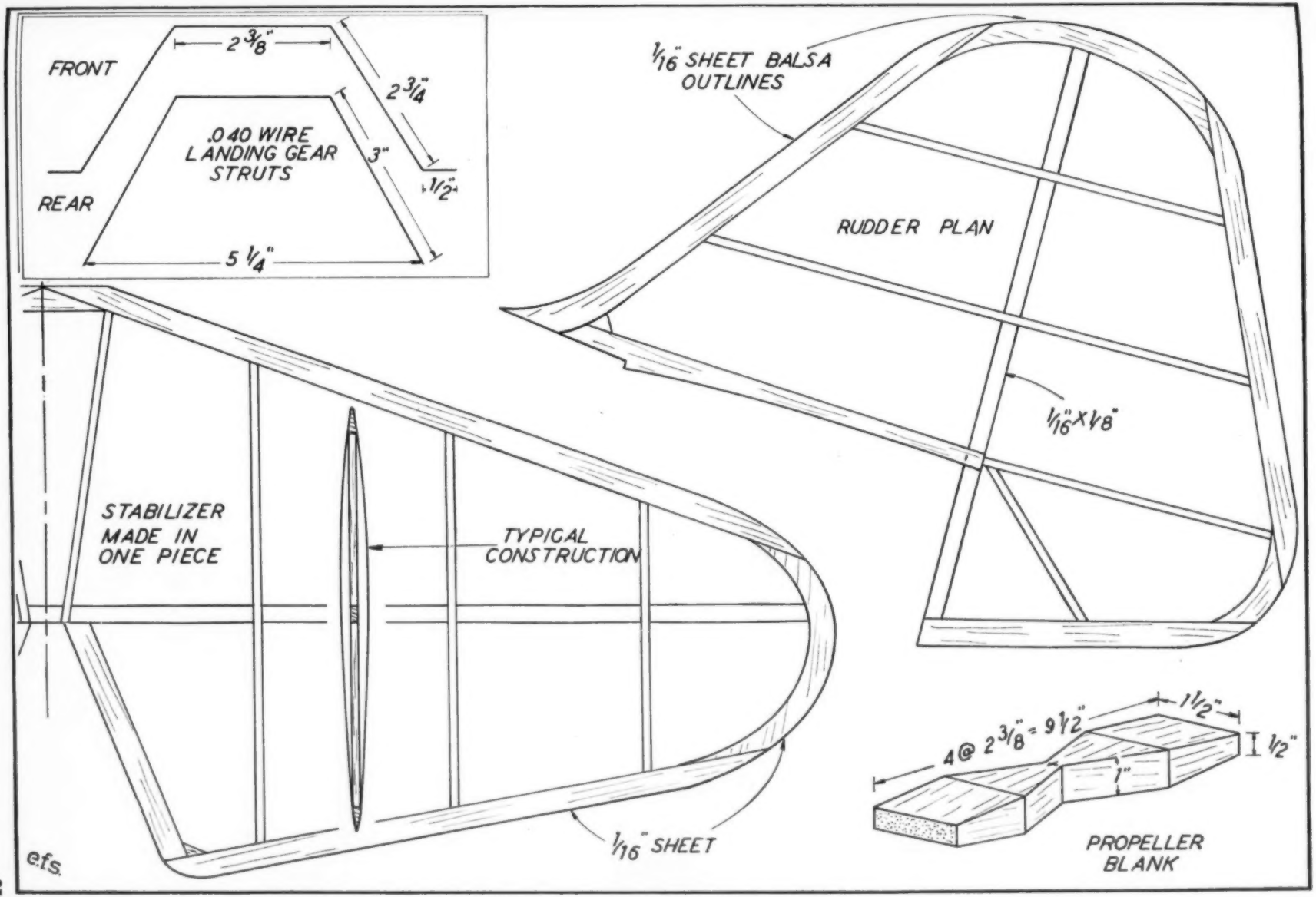
(Continued on page 39)


SHADED AREAS OF NOSE COVERED WITH SOFT 1/32" SHEET
CELLULOID WINDSHIELD
CENTER SECTION
1T
2T
3T
4T
SIDE WINDOWS CELLOPHANE
1S
2S
3S
1B
2B'
2B
3B
4B
TAYLORCRAFT O-57
BY EARL STAHL
.040 MUSIC WIRE
1/16" SHEET
TWO BOTTOM STRINGERS END HERE
THE CENTER SECTION IS BUILT INTEGRAL WITH FUSELAGE
SEVERAL CROSS-PIECES OMITTED FOR CLARITY

SEVERAL CROSS-PIECES OMITTED FOR CLARITY




"VEE" STRUTS
1/8"X1/4"
1/8" SHEET
1/16" SQ.
3/32" SQ.
10 SPACES @ 1 1/2"
(WING PLAN 1/2 SCALE)
1/8"X3/8"
FLYING MODEL SHOULD
HAVE 1 1/2" DIHEDRAL
FULL SCALE
WING TIP
FRONT VIEW
1/3 SCALE
BAMBOO
REGULAR - 18 REQ'D
RIBS CUT FROM
SOFT 1/16" - 1/20" SHEET
TIP - 2 REQ'D
ds

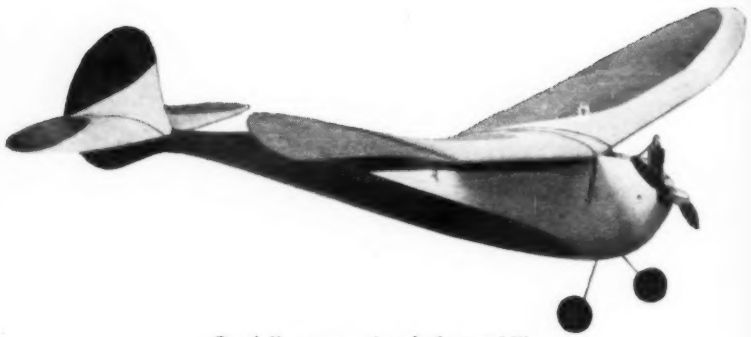

FRONT
2 3/8"
2 3/4"
.040 WIRE LANDING GEAR STRUTS
3"
1/2"
REAR
5 1/4"
1/16" SHEET BALSA OUTLINES
RUDDER PLAN
1/16"X1/8"
STABILIZER MADE IN ONE PIECE
TYPICAL CONSTRUCTION
1/16" SHEET
4@ 2 3/8" = 9 1/2"
1 1/2"
1 1/2"
1"
PROPELLER BLANK
efs

BUILDING THE "RAIDER"

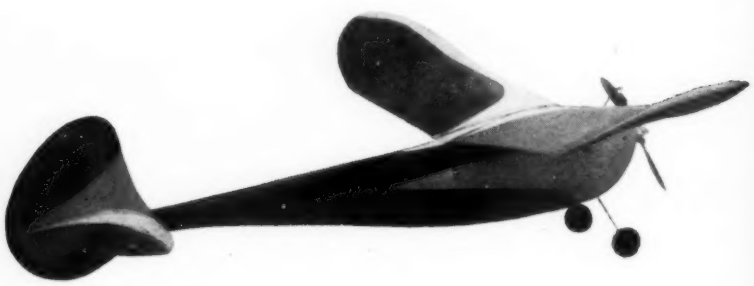
A high performance contest plane that will win in any contest

by

M. LA TORRE



Carefully proportioned for stability and efficiency with sleek lines and deep body; side area below center of weight



THE C-Raider is a contest ship. Let us state that most definitely; it was designed and built for contest work, and as such it has performed in excellent fashion. Yet it is fairly easy to build.

It is well known that ships with a long tail-moment arm are extremely stable. Their only drawback is some sensitivity in rudder, otherwise they will take power that will spin in ordinary ships and will really perform in the toughest of competition.

The C-Raider, in its original form, was slightly longer than shown in this article. The revised ship, described in these pages, is much more stable than the original and shows about 20 percent improvement in climb and glide. It is designed for any motor of .60 cubic inch piston displacement, and weighs approximately 3 pounds, giving a wing-loading of 8 ounces per square foot. Due to the large area, comparatively short landing gear and low wing loading, it seldom suffers any damage no matter how "hot" the landing. Ninety-nine and 44/100 per cent of the time the ship sets down "like a baby," and has never nosed over in any landing. The original ship has had nearly 100 flights and has never suffered damage except when hitting a concrete abutment. (It was the fault of the abutment . . . no kiddin'.)

The C-Raider can be built for about $3.00, complete, less coil, timer and motor. In fact the cost is very low considering the ship's size and the beauty of the finished job.

Now just a word about the ship's contest record. It was first flown at the Eastern States Contest, sponsored by MODEL AIRPLANE NEWS and the Kresge Department Store of Newark, N. J., early in 1940. In the contest, against the best modellers in the East, it took first in Class C Junior, averaging 2:12. Its best flight was nearly five minutes. During the contest season of 1940 it placed in several other contests: in measured trials conducted by the Sky-Scrapers Club, it never did less than 2 minutes on 15 second motor runs. It would consistently do 3 minutes on 20 second runs.

In a typical takeoff, with motor wide open, the wheels scarcely turn over before the model has cleared the runway and pointed for the zenith.

BUILDING THE C-RAIDER: The first step in building the plane is to scale up the plans from the drawings provided; each plate is shown in a specific scale. The largest plate, covering fuselage construction, is shown six times smaller than the original ship. In other words each dimension should be enlarged six times. A large sheet of paper (readily obtained from the nearest butcher shop) is ideal for the purpose. After the plans have been drawn to exact size construction may be started.

Note that the "core" of fuselage construction is the square crossection shown in A, B and C. Start construction by making the square fuselage core from specified woods. Top longeron, of 1/4" square medium balsa, should extend five inches, as you will note, to the front of the cowl. The entire box is built of 1/4" square except cross braces from rear of cabin back are 1/4" x 1/8" balsa. This box, when completed, comes together at the tail and the front is open to be attached to the firewall when the latter is installed.

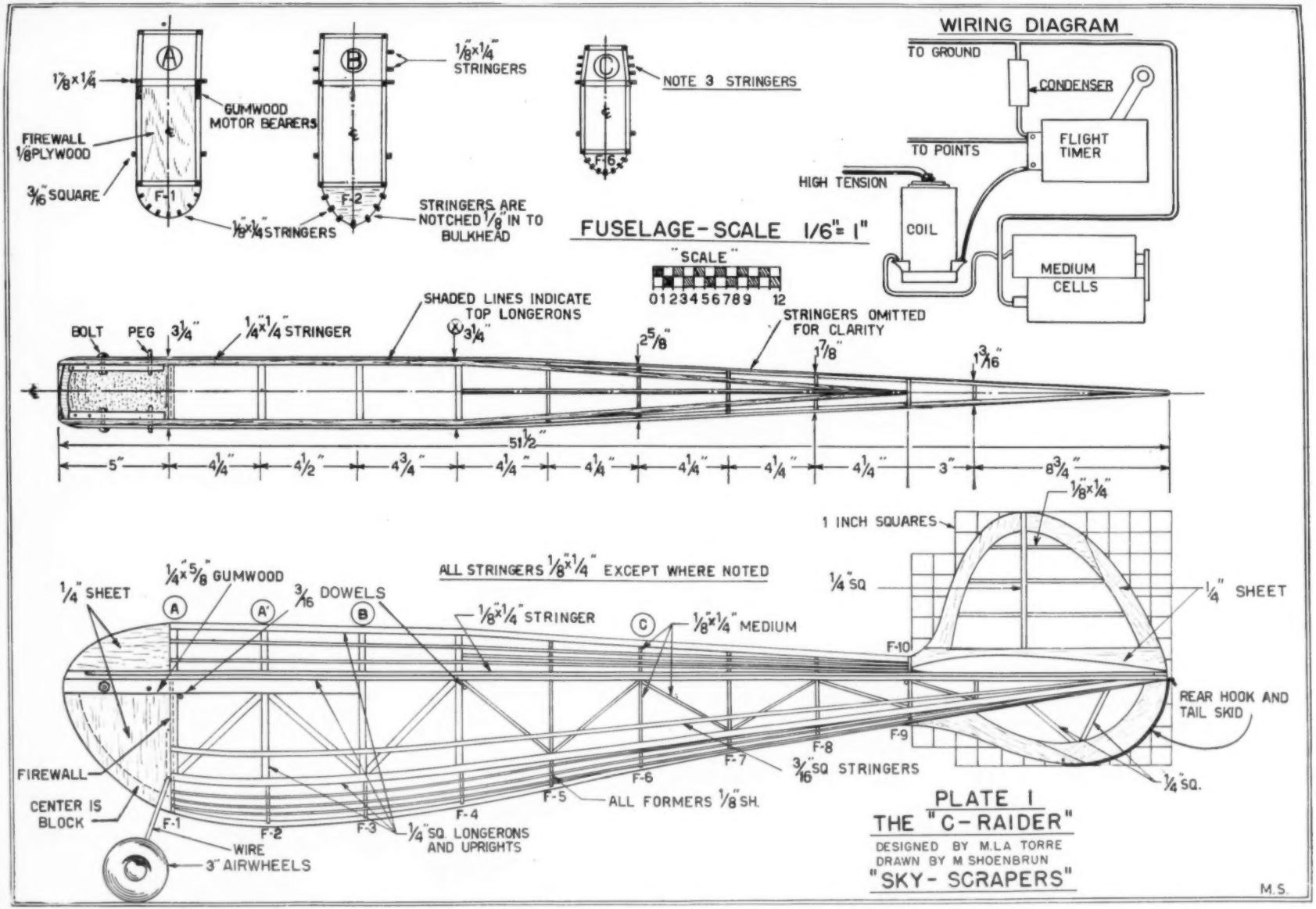
Next cut the firewall from 3/16" birch plywood. Before proceeding further, bore the small holes in the firewall and bend the landing gear to outline shown. Landing gear, of 1/8" tempered music wire, is next tied to the firewall with strong linen thread and the entire fitting cemented thoroughly. After drying several hours give it another coat. The entire firewall also receives a coat of cement, to prevent oil absorption.

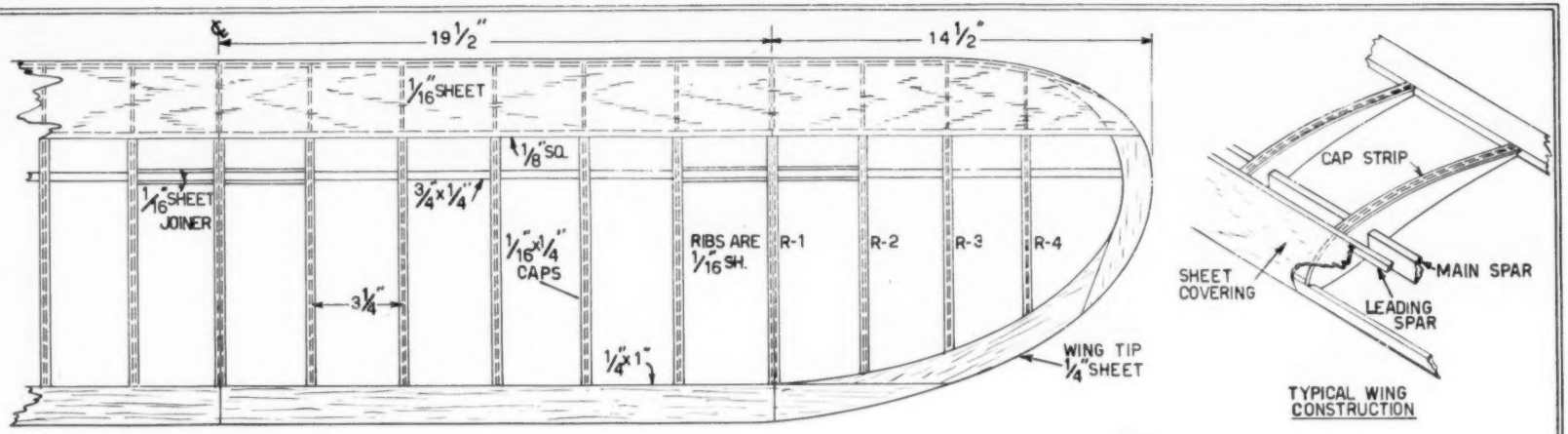
When the firewall is complete the formers should be cut out from patterns shown, from 1/8" medium sheet balsa, notched as indicated. When deep notches are shown they should accommodate the 1/4" x 1/8" stringers. The formers are then cemented in place at the stations on the bottom of the fuselage box. The first former (F-1) cements to the bottom of the firewall and, as you will note, is deep-notched. Except for F-1, all formers are 1/8" narrower than the box on each side.

Returning to the box construction, next addition is the motor bearing unit. Each bearer is of 5/8" x 1/4" gumwood. If such material is not obtainable any similar tough wood may be used; birch plywood may be substituted in an emergency. These bearers extend from the cowl front, through the uprights of the box at stations A and A' and butt against the vertical upright at station B. They are cemented thoroughly to the top longeron and, of course, to the uprights which they intersect.

Once the bearers have been installed the cabin is constructed. The cabin top longerons rest upon 1/4" square uprights

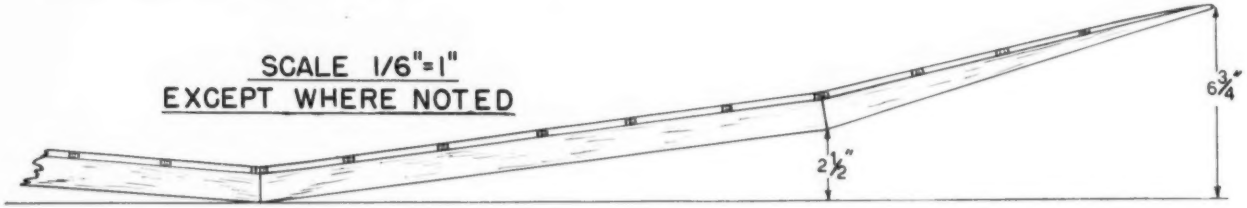
(Continued on page 36)

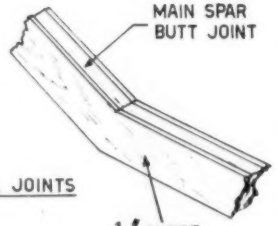

WIRING DIAGRAM
TO GROUND
CONDENSER
FLIGHT TIMER
TO POINTS
HIGH TENSION
COIL
MEDIUM CELLS
A
B
C
1/8"x1/4" STRINGERS
NOTE 3 STRINGERS
1/8"x1/4"
GUMWOOD MOTOR BEARERS
FIREWALL 1/8 PLYWOOD
3/16" SQUARE
F-1
F-2
F-6
1/8"x1/4" STRINGERS
STRINGERS ARE NOTCHED 1/8" IN TO BULKHEAD
FUSELAGE - SCALE 1/6" = 1"
"SCALE"
0 1 2 3 4 5 6 7 8 9 12
SHADED LINES INDICATE TOP LONGERONS
STRINGERS OMITTED FOR CLARITY
BOLT
PEG
3/4"
1/4"x1/4" STRINGER
3/4"
2 5/8"
1 7/8"
1 3/16"
51 1/2"
5"
4 1/4"
4 1/2"
4 3/4"
4 1/4"
4 1/4"
4 1/4"
4 1/4"
4 1/4"
3"
8 3/4"
1/8"x1/4"
1 INCH SQUARES
ALL STRINGERS 1/8"x1/4" EXCEPT WHERE NOTED
1/4" SQ
1/4" SHEET
1/4" SHEET
1/4"x5/8" GUMWOOD
3/16 DOWELS
A
A'
B
C
1/8"x1/4" STRINGER
1/8"x1/4" MEDIUM
F-10
REAR HOOK AND TAIL SKID
F-9
F-8
F-7
3/16" SQ STRINGERS
F-6
F-5
ALL FORMERS 1/8" SH.
F-4
F-3
F-2
F-1
1/4" SQ LONGERONS AND UPRIGHTS
FIREWALL
CENTER IS BLOCK
WIRE
3" AIRWHEELS
1/4" SQ.
PLATE I
THE "C-RAIDER"
DESIGNED BY M.LA TORRE
DRAWN BY M SHOENBRUN
"SKY-SCRAPERS"
M.S.



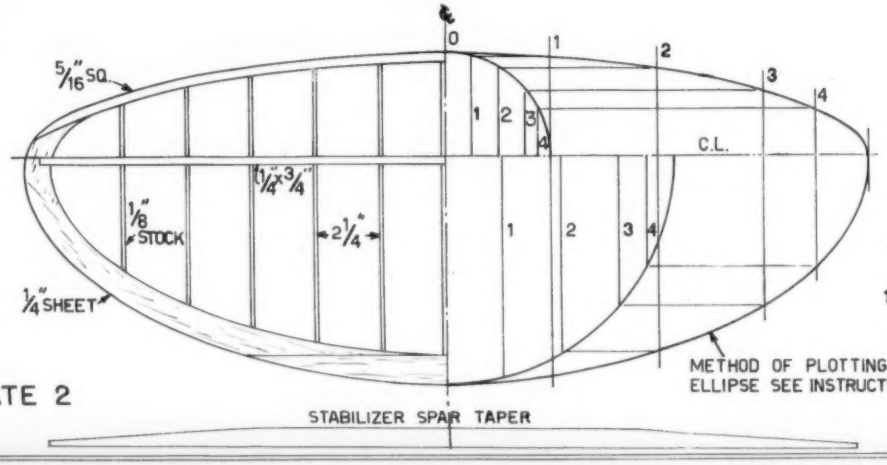
TYPICAL WING CONSTRUCTION

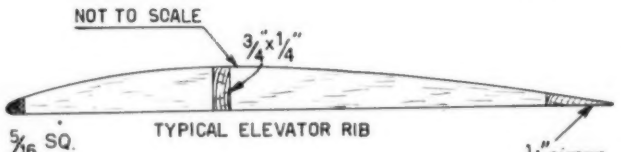
SCALE 1/6" = 1"
EXCEPT WHERE NOTED





DIHEDRAL JOINTS





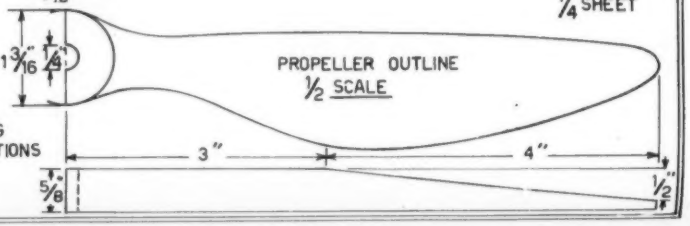


PLATE 2

M.S.

STABILIZER SPAR TAPER

M.S.

5/8

1/2

"R-1" 13 REQ.

"R-2" 2 REQ.

"R-3" 2 REQ.

"R-4" 2 REQ.

PLATE 3 FULL SIZE WING RIBS

M.S.

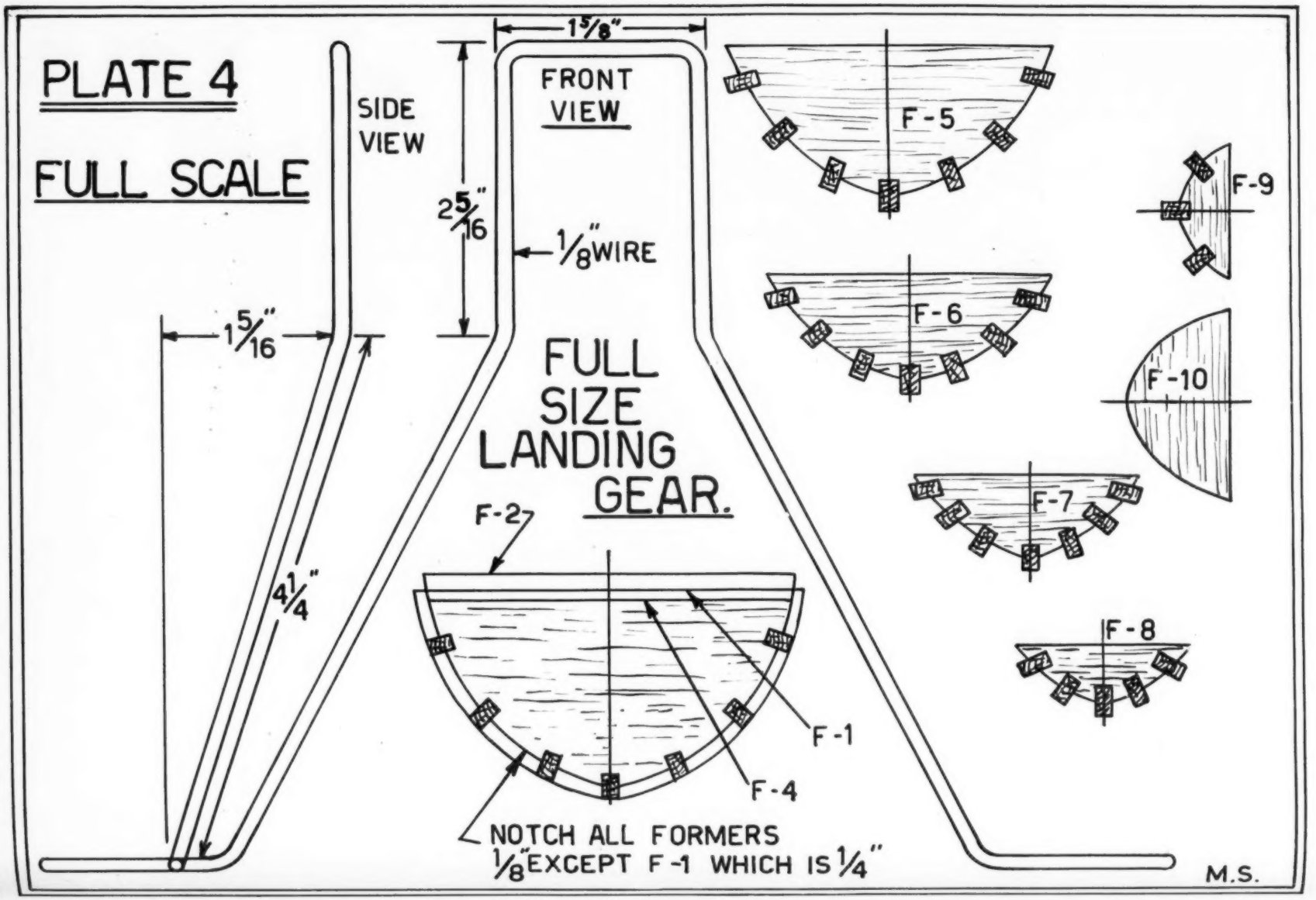


PLATE 4
FULL SCALE
SIDE VIEW
FRONT VIEW
1 5/8"
2 5/16"
1/8" WIRE
1 5/16"
4 1/4"
FULL SIZE LANDING GEAR.
F-1
F-2
F-4
F-5
F-6
F-7
F-8
F-9
F-10
NOTCH ALL FORMERS 1/8" EXCEPT F-1 WHICH IS 1/4"
M.S.

Air Ways

(Continued from page 17)

and at present there is prospect that the reply will be negative.

Consequently we appeal to the model builder directly to put his shoulder to the wheel and help serve his country and save himself. He is the one who will have the greatest influence upon officials in Washington. He has no commercial or political axe to grind and his sincerity of statements cannot be doubted.

Write immediately to the President, urging him to investigate this situation and not destroy the efficient aviation educational system for young men that has been developed and in which he has participated in the past to such advantage. Do this immediately—there is no time to be lost! The President may not heed one letter but ten or twenty thousand letters from model builders cannot go unnoticed. This is our goal—20,000 letters. Do your part and do not let the other model builders down.

In order to keep a record of those who write we request that model builders send to us their names and addresses. An Honor Roll of aviation patriots then will be printed in succeeding issues. Let's go, model builders!

* *

The wintry weather has curtailed outdoor activities considerably; many of the builders have been working indoors or have been concerned with defense matters. In consequence, no doubt, you model builders have not been so busy with your kodaks or taking pictures of your new creations. Do not let this deter you from sending in your news so other readers can hear about your activities through the columns of Air Ways. Let them see what your latest creations look like—this helps everyone.

Some interesting pictures and comments have been received this month. The Plane of the Month is from Frank McElwee, Davis Street, Cranford, N. J., shown in picture 1. It is a Class A gas job which took first place at the Sky-Scrapers meet in 1940 and first at East Paterson the same year. It took third in a number of other meets and is still operating efficiently. It is a very neat looking job, its stability being enhanced by the large upturned wing tips. Lately model builders are also gaining greater stability by concentrating their weights; that is, shortening the nose and building the tail units lighter. This assures quick recovery from dangerous flight attitudes.

Hugo Gooderum, Jr., of Canby, Minn., has built a beautiful scale Rearwin Speedster, shown in picture 2. Through the open cabin door the control stick and instrument panel are visible. All details, including controls, seats, safety belts, hinges on the doors are included, requiring 4 months of continuous building to complete. The fuselage is covered with 1/32" balsa, the nose planked with 1/16". It has an attractive color scheme of silver with blue trim.

The finish was not the least of the operations required, for this included 3 coats of wood filler, 3 coats of banana oil, 3 coats of pure dope and 2 coats of color dope—11 coats altogether. All of these were carefully rubbed down after each application and finally waxed. The model includes more than 450 separate parts.

Models of Wold War I are fascinating not only because of their historical value but for the amount of detail they usually included. Here we have a model, picture 3, that is not only built to careful scale but is powered with a real gas engine. It is a Sopwith Camel with a wingspread of 55 inches, weighing exactly 4 pounds ready to fly. The wing loading is very close to 8 ounces per square foot. So far it has made 30 successful flights with only 2 bad smash-ups. This is unusual for this type of ship; its extreme stability under power and glide accounts for this. One of its outstanding features is the slow landing speed; another is the incidence angle in the top wing and adjustable elevator. The entire plane is covered with silk except for rounded surfaces where sheet balsa is used. Stuart McMillin of Danville, Calif., Box 47, is the builder and we believe he can be credited with being the first to build a scale gas model of this great plane. He is now working on a scale Triplane which gives promise of excellent performance.

Robert Wynne of 2130 Pascheco Blvd., Martinez, Calif., has been a model builder for many years, in fact, he has read Model Airplane News since 1930. Though not engaged in model building as a business, occasionally he turns his hand to this work and sends us picture 11; an unusual posed shot of his Lockheed Electra. It is most realistic and one could easily mistake it for a real plane coming in for a landing. The supporting wires have been very cleverly hidden; in fact, there is no retouching on the picture whatsoever. The ship features a workable retractable landing gear, detailed motors and furnished pilot's cockpit. Incidentally Mr. Wynne keeps a file of all Model Airplane News magazines but is missing copies of April, 1935, June, 1937, and other scattered copies. He would like to contact readers who could supply them.

Jack Moralex of 1118 O Street, Lincoln, Nebraska, sends picture 8 and no doubt it will inspire great envy, for such a collection of detail scale World War I planes is not often seen, let along collected together under one hanger roof. These planes were built to ½" scale by Andy Smith. They are not solid but built-up jobs, featuring fully detailed motors and cockpits, movable controls in thet cockpit and shock chord on the wheels. The collection represents 2 years of work. Included in the pictures are a Spad, Fokker D8, S. E. 5, Fokker D7, Fokker Triplane, Nieuport, German LVG fighter and Halberstad.

Picture 5 comes from Arthur Opfer, Jr., of 4734 Liberty Heights Avenue, Baltimore, Md., publicity director of the Aero-Craftsmen Gas Model Club of Howard Park. It shows the 3rd annual gas model meet with part of the 134 fliers and 5,000 spectators who attended. There were over 200 planes taking part; trophies and prizes were valued at more than $500. This club was 4 years old on January 6th and now has a membership of 47. It was originally organized by T. W. Schindler and Mr. Opfer, and is now under the direction of Oliver L. Davidson, Jr. The picture shows the contest in full swing at the club's private airport.

Picture 6 shows Jack Anderson of Ottawa, Kansas, with his first gas model. He started building rubber models 2 years ago. Evidently Anderson has received excellent practice and training through rubber model instruction before he tackled his job, for this plane is exceedingly well built.

Picture 7 comes from Mexico and shows the three Rivero Gavito Brothers who won the first three places in the December, 1941, contest of the National Federation of Aeromodelers of Mexico. They are: 1st, Jose; 2nd, Manuel; 3rd, Alvaro.

Contrary to the understanding of many American model builders, model flying is enthusiastically and extensively carried on in Mexico. Regular contests are held as in the U. S. and, believe it or not, the average workmanship displayed on Mexican builders' models is far superior to that of American boys. They appear to do their work more carefully and precisely; there is hardly a model that is not a work of art and much longer time is spent on perfecting the model's structure before it is flown.

In picture 9 is an unusual stick model built by Jack Westell of 34 Ottawa St. South, Hamilton, Ont., Canada. Unlike the average stick job, it has a landing gear. Primarily it was built for sport and practice flying; nevertheless it has flown for more than 2 minutes. This is Westell's first design and he is extremely pleased with it. He says that the proportions forming the design's basis were taken from the articles, "Model Designing Simplified," appearing in Model Airplane News. The ship has a 25 inch wingspan with a 9 inch propeller and is an exceedingly steady flier. Westell now plans to design a larger, hand-launched stick job.

Francis Munson is a private in the 2nd Platoon, D Btry, 12 NB, 4th Regt., Fort Bragg, N. C. He has carried his model airplane hobby with him into the Army, and says: "Army life has not entirely curtailed my model flying, though certain flight restrictions have been necessary." Consequently he now flies G-line ships. In picture 10 he is shown with his Fireball, named "Kid Doke 23d", it being his 23rd gas model. It is powered with a Forster "20," which drives the ship 65 m.p.h. So far it has had 66 flights and he says: "Believe me, it creates quite a sensation around the post."

A gas job of very unusual design is shown in picture 12. This job has been carefully laid out according to aerodynamic force arrangement and embodies the unusual feature of a motor cowling that blends into the wing. In this way drag is reduced without detracting from the appearance of the ship. The ship was built by Chester O. Morris of 16 West Mt. Ida, Alexandria, Va., who says it has never broken anything more than a propeller and that was when it landed in a woodpile. Many models unquestionably have landed eventually in the woodpile but this one lived to fly again! The ship has a 6 foot wingspan and weighs 27 ounces.

Incidentally, Morris wants to know why articles have not appeared on stresses developed in gas jobs. Are there any readers who would be interested in this type of article?

Picture 4 is an example of a very excellent stick job. The "veed" stabilizer with no fin is unique. Evidently it gives fine results, for Dean Landreth of 1612 S. White Avenue, Pomona, Calif., its builder, tells us

(Continued on page 48)

The MODEL BUILDER of Today will

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This new class "B" gas model features an innovation in construction which enables even a beginner to produce a perfectly aligned streamline fuselage in HALF the time usually required! Designed purposely to meet the need for a more efficient, rugged, pursuit-like design combined with a fast climb and a slow, soaring glide. Wingspan—50"; Overall length—33½"; Wing area—370 sq. in.; Total weight (with motor)—22 ozs. Complete kit, postpaid or at your dealer .....

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Academy of Model Aeronautics

(Continued from page 20)

changes in model aviation programs, but, by the use of new methods and substitute materials, it will be possible to offer a highly interesting and instructive course despite wartime conditions.

Write: Air Youth Division, National Aeronautic Association, 718 Jackson Place, Washington, D. C. Enclose 10c in coin or stamps to cover mailing costs; send 15c for air mail delivery. Ask for *Training Bulletin No. 1.* With it we will send you a further bulletin on how to organize a junior aviation club in your community so that the young people can carry on outside the classroom in activities of direct bearing upon America's war effort.

TIME IS SHORT. Write N. A. A. TODAY!

Air Youth Program Developing

Formal transfer of the properties of Air Youth of America to N.A.A. has been completed. At the present writing, A.M.A. Headquarters is knee-deep in furniture, files, and equipment moved to Washington with the closing of the Air Youth office in New York.

The general scope of the consolidated junior aviation program is indicated by the accompanying organization chart.

The Acting Director of the Air Youth Division, A. L. Lewis, Executive Director of the Academy of Model Aeronautics.

Plans are progressing to carry on the going programs both of the Academy and the Air Youth Division without loss of headway; rather with impetus from the combined facilities.

First objectives will be to campaign for aviation education in the public schools and for the organization of local clubs to organize the activities of the model builders and flyers outside of school hours. The Academy of Model Aeronautics is conducting a defense roll call to spot the location of all junior aviation clubs now organized.

One of the immediate aims of the program will be to build scale models of fighting planes to help train military and civil defense personnel in aircraft identification. Model clubs already are volunteering their services. A group of 100 aeromodelers in Toledo, Ohio, the "Model Manglers," sponsored by the local Exchange Club, has pledged all-out service to the Toledo Civilian Defense Council, with the statement that "members are experts at identification of different types of aircraft and that the modelers could act as spotters in air raid service, as well as instruct other defense workers in identification."

Model Flying in Wartime

Regulations to limit the duration of flights of model aircraft to 3, 4 or 5 minutes are being drafted by the Contest Board of the N.A.A. Academy of Model Aeronautics. This is a wartime measure. Many of the flying models, powered by miniature gasoline engines, are so realistic in appearance that they are often mistaken for full-scale aircraft and might occasion erroneous reports from aircraft spotters.

The proposed rule will not allow the models to rise high enough or to go far enough from the point of departure to cause any possible confusion. Already a number of modelers are using flaps, spoilers, and dethermalizers to make models land within a certain period.

New A.M.A. Headquarters

A.M.A. headquarters have moved from the Willard Hotel to 718 Jackson Place, N. W., Washington, D. C. All mail should be addressed to the new address from now on and we hope all members visiting Washington will drop in and see our new offices.

VICTORY

Model Designing Simplified

(Continued on page 19)

erted on the wings; consequently they should be strong enough to support several times the normal load. When supported at tips the stress at wing center will be about double that of normal flight. This is an excellent way to test a machine when completed; the wing usually will be strong enough if it does not break when supported at the tips and joggled up and down.

With practice builders are able to determine the exact size of the spars to use in any particular case; however, it is always best to make the spars with over-size cross section if there is liable to be any doubt concerning their strength when finished. Remember the deeper a spar is, the stronger it is for its weight, so it is always best to make the spar nearly full depth of the airfoil section wherever it may be located.

Quality of material also has a bearing upon spar strength. These members should always be made of balsa that is hard and tough, not pithy or soft. The plans indicate size required for this plane. They should both be made of equal strength, consequently the rear spar is about 25% wider than the front.

The leading edge may be easily damaged when flown in rough country if it is not fairly strong, therefore 1/4" square medium hard balsa is used. As explained, the trailing edge must be strong enough to prevent warping. A piece 1/8" x 1/2" will be sufficient; this should be hard balsa also.

Leading edge strip should be made of fairly light 1/32" sheet balsa. In the plans we see that this is countersunk on the leading edge of each rib, which is cut away to accommodate it. The wing tip edge should be approximately the same size as trailing edge. This may be formed from several pieces in order to keep the grain running approximately parallel with their lengths.

Gussets to fasten wing halves together at the center should develop full strength of the spar, thus they should be as deep as the spars and their combined width equal to spar width. These should be made of hardest, toughest balsa and cut to shape shown on the drawings.

The stabilizer may be made quite light inasmuch as this part carries little load, in fact there is practically no pressure on it during normal flight. The greatest stresses are developed usually when hard landings are made. As in the case of the wing, however, spars should be the strongest part and in this case leading and trailing edges help to strengthen it spanwise as well as

the spars. Spars of size shown on the drawing will give great strength.

Breakage from hitting obstacles will be prevented by using a deep but narrow strip along the leading edge. Trailing edge should be fairly thick to prevent warping: 3/16" x 1/2" is used. Wood of this size is continued in a curve around the tip, this being formed by several pieces glued together like the wing.

In this ship the fin is not large, therefore it need not be a complicated structure; a flat sheet of 1/16" medium hard balsa will serve nicely. Correct outline is given on the plans, half size. To make it full size double the size of squares and mark points at which the curved outlines intersect graph lines. Then draw the outline of full size fin.

Assembly

The wing assembly is quite simple when proper procedure is used. First lay the 2 main spars of one wing half on your workbench and mount the ribs at correct intervals along the span. Then cement all joints tightly together, making sure that the ribs are perpendicular to spars. It is best in this case to pin spars tightly to the bench so the wing will retain its form while cement is drying.

Next insert and cement the leading edge to ribs. After notching the trailing edge at correct points so rib ends will fit into it, cement this part tightly in place, making sure that it is parallel with the leading edge. If it does not rest flat on the bench, insert shims to hold it in place while the cement is drying. Then cement the curved wing tips to leading and trailing edges and spar ends, pinning them together in the proper form. After the cement has dried thoroughly cement leading edge sheet in place. Cement should be applied first to the trailing edge and the sheet pinned to it tightly. Then cement should be run along the top of each rib and the sheet pressed down tightly, holding the rear edge with pins at ribs.

When the 2 halves are completed they may be joined together by cementing the gussets to the front and rear faces of the spars and raising the wing tips sufficient to form the chord dihedral, namely 4" at each tip. The center of the wing may rest on the bench, wing tips being supported by blocks or other objects until the cement is thoroughly dry. Next cement 1/32" sheet covering top and bottom to the 2 center panels.

The wing is then ready to be covered; Silkspan or heavy paper can be used. The usual procedure is to cut out material to general outline of the wing half, allowing sufficient to round the edges for trim, usually about 3/8" to 1/2". Start covering by cementing a strip to the center ribs, in this case the balsa sheet panel. Then cement it to each rib progressively from root to span, stretching the paper spanwise as it is pressed down to each rib. When in place cement the covering at leading, trailing edges and tips down tightly and trim off surplus paper.

The stabilizer should be assembled and covered in similar manner. However, this is made in one piece and not 2 halves, the spars running continuously from tip to tip. The fin then may be assembled to the stabilizer by cementing it to the center rib in an exact vertical position. Two fuselage fillets of very light balsa should be cemented to the top front surface of stabilizer and fin on either side of the latter. These two pieces serve to continue out the streamlines of fuselage and to support the fin.

The lower fin should be cemented vertically to the underside of the fuselage. The rear part, B on the drawing, passes up to the rear of the last bulkhead, J. Two fillet pieces, B, are cemented to both sides of this lower fin, streamlining the fuselage to the fin edge. When stabilizer bed, A, is cut out to correct form and cemented to the upper edge sections of sub-longerons, the fuselage structure will be completed. The isometric drawing shows A in its correct position as well as the balsa filler blocks at the leading edge of the stabilizer supporting the fin.

Next month the design of the pylon, motor mount and other detailed parts will be outlined and a complete set of plans for the model presented.

VICTORY

Building the "Raider"

(Continued from page 26)

which extend upward from the top longeron of the box. This construction may be noted in the crossection views. These cabin longerons are also 1/4" square, built 3-1/4" wide back as far as point X, the final upright in the cabin. Cement the structure thoroughly but do not complete the taper to the top cabin longeron until the structure is dry. Then bend the two trailing pieces together until they meet in a point at (former 10) where the rudder begins. The top of the body is now completed by cementing uprights of 1/4" x 1/8" from the top cabin longeron to the top longeron of the original box. Stringers of 1/4" x 1/8" are then cemented along the cabin sides, extending back to the rear former station. Note that 3/16" square stringers also extend along the body sides, as shown on fuselage side view. Bottom stringers extend to the rear of the tail assembly.

The cowl is extremely simple in construction, being built of sheet and block. Cut the curved block which makes up the front and cement it between sheets of 1/4" medium balsa which form the sides. It is best to leave the sheets a trifle larger than the finished outline, but the whole assembly is cemented thoroughly, both to the motor bearer and firewall. After cement has dried thoroughly the job of sanding the cowl to a smooth outline is started. Try and make the finished job conform as nearly as possible to the original shape. When finished coat the assembly with cement, rubbing it into the wood with the finger. Sand it again after this step and finish with a sanding of 10/0 wet-or-dry paper to give additional smoothness.

The under rudder, which is of 1/4" sheet balsa with 1/4" square braces, is cut according to the outline given, and is cemented to the bottom of the fuselage as shown. The rear hook and tail-skid is of .040 wire and, as you will note, extends from the bottom of the under rudder to the extreme end of the fuselage. It is cemented in place and for added strength

may also be bound with linen thread. Be sure this under-rudder is straight with the rest of the assembly before proceeding further. After the cement joints have dried, sand off excess cement from the assembly and smooth down rough spots. The fuselage is then complete. Motor mounts, which vary in width with the motor used, are simply installed, this step being clearly shown in drawings.

TAIL AND RUDDER: The method of plotting the elliptical stabilizer is as follows: Take half the stab span and divide it into four equal parts, dividing the last section in half along the spar line marked C. L. Draw, with aid of a compass, an arc having a radius of 3-3/4". Divide that into four equal parts with the last section divided in half. Draw another arc with a radius of 8-1/4" dividing it in the same manner as above arc.

Draw horizontal lines connecting point 1 of arcs to point 1 of C. L. Do the same for remaining points 2, 3, and 4 of arcs. Where these lines intersect put a dot. After all dots are in their respective positions connect these and thus a perfect ellipse is obtained.

Note the elevator of the C-Raider features a lifting section. The airfoil in this section is not critical and is constructed very simply. The main spar, 1/4" x 7/8", tapers as shown on plans to the tip, at which point it is 1/4". The taper is from the top, the bottom line of the spar remaining flat. The outline is of medium 1/4" sheet, as shown. Ribs are all of 1/8" stock, except the middle rib, which is 1/4" stock inasmuch as it supports the rudder. Leading edge is 5/16" square, hard stock.

In the construction pin the main spar to the plan. Cut the tip and trailing edge outline to shape and pin it to the plan. Then add the leading edge and cement at joinings. Ribs vary in camber according to taper of the spar. These ribs are only as high as the spar. Note that. They are cut in two pieces, one extending from the leading edge to the spar, the other from the spar to the trailing edge. Do not form them until they have been cemented in place and cement has dried thoroughly. After the entire assembly is dry (and be sure of this) take the reliable old sand block and sand these ribs to meet the leading and trailing edges. As you will note the finished product is a slight lifting airfoil. The rudder is conventional. The outline is 1/4" sheet, the spar is 1/4" square stock. Ribs are of 1/4" x 1/8" stock. When this assembly is dry sand leading and trailing edges to a streamline section. Do not cement this to the elevator at this time.

THE WING: The airfoil used is a modified R.A.F. 32, which has proved one of the most efficient model sections ever produced. Cut the ribs from 1/16" stock, for inasmuch as the entire assembly is cap-stripped with a sheet-covered leading edge the assembly is plenty strong.

Leading edge is 1/4" square hard and trailing edge 1/4" x 1", medium. Main spar is 3/4" x 1/4" medium stock. Build the wing in two halves, using the plans as construction patterns. Pin main spar to the plan and place the ribs in proper places. After they have been laid in place, lay the trailing edge on the plan. The leading edge now is inserted as shown. The 1/8" square spar, which aids in sheet covering, is laid in place in the notch provided. Note the leading edge bends to form the tip; the trailing edge is cut to the curve shown on the plans.

Cement the ribs, leading and trailing edges in place, and give special attention to the spars, being sure they are not only well cemented but also are flush with the construction. After the entire assembly has dried (note that the polyhedral has not yet been formed) sand down the leading and trailing edges to complete the airfoil. After this finishing process you are ready to put in the polyhedral.

Lay the entire wing flat on the table top. Note that there is 2-1/2" dihedral to the break, and at the tip this increases to 6-3/4". Here's a simple way to accomplish this. Obtain a block 2-1/2" high and place it under the rib at the break. Cut leading, trailing edges and both ribs at this break, then cut these longitudinals on the proper bevel so they will butt joint neatly where severed. At the tip use a block 6-3/4" high and place this under the tip. Cement the cut sections at the break in dihedral and insert dihedral formers of 1/16" sheet. These are cut so that they are the same depth as the main spar and go on each side of same. Notches in the ribs for the main spar will have to be enlarged at the break, for the formers should extend at least 3" on each side of the break.

The polyhedral is comparatively easy to construct, requiring but a little "head work." When both sides of the wing are completed, join them at the center section. A jig, composed of two pieces of wood 2-1/2" high, and two additional pieces of wood each 6-3/4" high, are used to check the accuracy of your construction.

Sheet covering is added after the wing has been formed. This covering, which extends from the leading edge to the 1/8" spar, is of 1/16" sheet, 3" wide. Cap strips are 1/16" x 1/4" soft. They fair into the trailing edge and are sanded flush into the trailing edge at this point. Sand the wing thoroughly after construction is complete.

Use medium bamboo paper to cover the ship. Water dope it after fabric has been applied and when dry give it two or three coats of clear dope, sanding between coats with 10/0 wet-or-dry sandpaper to insure smoothness of finished work.

FLYING: Installation of motor, wiring, etc., should be of no trouble to any gas model builder.

The C-Raider is a remarkably easy ship to fly. First ascertain the trim of the model roughly by balancing; it should balance at a point about 50% to the rear of the wing leading edge. Glide the model without power several times, adjusting the rudder slightly until a slight right turn is obtained.

The first flights should be made with the motor running smoothly but only delivering about 40% of peak power. The model should climb to the left. If it does not, give the motor additional left thrust until this is accomplished. Loosening of motor bolts and twisting the engine should accomplish this added thrust adjustment. In its final complete adjustment the C-

Raider should climb in a tight left turn and glide with a slight turn to the right. The original ship had a circle of about 300 feet when properly adjusted and in this manner proved extremely thermal-conscious.

The first three times the C-Raider was flown with a 20 second motor run it made thermal flights, each one being over five minutes in duration. Best unofficial flight of the ship was 14 minutes, out of sight.

VICTORY

Sky Scouts

(Continued from page 8)

realistic decoration.

Those who have not sent in the answers to the first two installments already published should obtain these back copies, fill out their blanks and send them in immediately, for the pin is available only to those who complete the first two. All twelve must be submitted to obtain the gold pin.

The description of this month's planes follow:

PLANE "A"—The Nakajima 97, single seat low wing fighter assigned both to the Japanese Army and Navy squadrons. Powered by a radial engine completely cowled, the craft is equipped with two fixed machine guns of unknown caliber synchronized to fire through a three-bladed propeller. Its thin wing may house two additional guns; however this is doubtful. Greatly resembling the first low-wing Boeing fighters, the "97" becomes easy prey to the Sky Scout inasmuch as its thin oval fuselage, fixed landing gear, and forward located cockpit with its oversize headrest cannot be associated with any other fighting craft used by the Japanese. Reputed as having a speed in excess to 250 miles per hour, and an endurance range of approximately five hours, the appearance of this craft automatically forewarns of Naval units nearby, and of impending Naval action.

PLANE "B"—The Nakajima "91," single seat high wing fighter of '37 vintage. Powered by an imitation Bristol Jupiter engine, the craft is capable of speeds in the 200 MPH neighborhood and has proven to be a very maneuverable and capable fighter. It mounts two Vickers machine guns firing through the propeller. The engine is encircled by an anti-drag ring while each individual cylinder is faired by a cone placed directly aft of the engine. Its complex array of struts, and antiquated engine fairing arrangements are its primary points of recognition. The craft appears to have a fabric covered wing and tail. The fuselage is fabric covered aft of the cylinder fairing to the tail surfaces. The forward portion is of necessity metal.

PLANE "C"—Mitsubishi "Hinazuru" (Young Crane) is the Japanese version of the English Airspeed Envoy. Originally manufactured by the Mitsubishi Company under license along with the required "Lynx" IV-C engines as an eight passenger transport and now fitted for military assignments as a bomber. The conversion from transport to bomber requires only the addition of bomb racks and machine gunners turret. Designs permitting this conversion were first developed in 1936 and have hence been molded to perfection. The Envoy or "Hinazuru," as the little "yellow man" call it, is a low wing cantilever monoplane of wood construction, with covering of plywood and fabric. The craft has a speed well within the 200 MPH range and a flight range of over 600 miles. Its initial climb is about 1,250 ft. per min. and its service ceiling approximately 22,000 ft.

PLANE "D"—The Kawanishi 95, two place Naval observation craft equipped with float and capable of operating from battleships similar to our own Voughts. Powered with a radial engine of unidentified manufacture, completely housed in NACA type cowling, the Kawanishi bears a striking resemblance to the early Chance Vought single float fighters used by the United States Navy. The resemblance is almost exact except for the odd shaped rudder which presumably "honorable" Japanese designers have changed primarily to avoid "unfavorable" criticism from the originators of the design. The craft is armed with fixed and movable guns and also carries the equivalent of our 100 lb. bombs beneath the wings. Two such bombs are carried on this Jap craft.

VICTORY

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Fighting Planes of the Future

(Continued from page 12)

type of plane, there are several design errors which would make this plane both unstable and unmaneuverable. Modelers have discovered the principles involved here by building and flying gas models of this type.

In plane 5 you see a normal high-speed pursuit ship, with pusher propeller behind the tail unit. This is not so far removed from present design, but in both this and plane 1 the practical man will ponder how it is possible to land this plane tail low with the vertical fin surface below the fuselage.

Plane 3 shows a prospective four-engine bomber, engines staggered as tractors and pushers with guns placed conveniently for wide arc of fire. Here also you see the trend toward the flying wing, the fuselage, in fact, being the entire wing center section, transforming drag into lift, contrary to orthodox airplanes. There have been advocates of this type plane and a number of such ships have been built since 1919.

Plane 6 illustrates a most unusual high-speed coaxial twin propeller pusher pursuit job. Here also the center section serves as fuselage, cutting parasite drag to a minimum. Control even at slow speeds is augmented by slipstream action over the tail surfaces.

Another version of a high-speed coaxial propeller pusher pursuit is shown in plane 2. This is a much smaller plane, the wing being too small to enclose the fuselage.

Plane 4 represents a light bomber in which the power unit is located within the fuselage, driving outboard pusher propellers through intermediate shafts. Here engine nacelle drag is eliminated at the expense of slightly increased weight. However for every pound of drag reduction, twelve pounds extra lift can be obtained, a fact justifying the design.

A treat is in store for our readers during the coming months: articles will appear in which these planes are to form the basis of interesting design discussions, building and flying.

Watch for the first feature in our next issue!

VICTORY

Hedgehop With the "Grasshopper"

(Continued from page 21)

and flight performance is matched only by attractiveness.

CONSTRUCTION. — Before starting, the fuselage plans should be joined; incidentally, if you do not want to mar your magazine, make tracings of the plans on semi-transparent paper.

First make the fuselage underframe, of 3/32" sq. balsa longerons and cross-pieces, indicated by light shading. Make two side frames, one atop the other for identity; the cement will probably cause them to stick together but they can be separated by a razor blade. When dry, invert the side frames over a complete top view plan and join with 3/32" sq. cross-pieces at the cabin. Next pull the backs together and add remaining cross-pieces in the rear. Crack longerons just in front of the cabin to pull sides together, as shown. Check continually for correct alignment.

The various fuselage formers are shown; cut from each medium grade 1/16" sheet. Cut the notches shown and cement to place. Stringers are medium hard 1/16" sq. strips; fit in the notches and cement fast. From the cabin back stringers are cemented directly to the sides of the under frame. Center section ribs, cut from 1/16" sheet, are shown; two are needed with a third center cut as shown by the broken lines. Cement them to top longerons, against the inner edge leaving a 1/32" ledge on which to later rest the wing panels. Finish around the cabin by adding the wedge-shaped pieces. The curved back windows are cut from 1/16" sheet.

Cover the nose with soft 1/32" sheet, but before installing remove the cross-piece centers under the upper formers on the nose so they will not interfere with the rubber motor. Use the widest sheet available; cement it to the entire adjacent frame using pins and rubber bands to hold it in place until dry. Extreme front of

A large high pitch prop gives it long duration

the nose is a solid block or laminations, as shown. Roughly cut to shape, cut out hole for the nose plug, then cement to the fuselage front. When dry, cut the block to a smooth shape, then sand entire nose to shape.

Bend the two landing gear struts to shape and size shown from .040 music wire, attach to fuselage by neatly binding with thread and then applying several coats of cement. Join bottoms of the struts by soldering or with thread and cement. The 1/16″ sheet fill-in can be cut and fitted but should not be attached until the fuselage is covered; the center struts likewise.

Make full size plans of the right and left wing halves so parts can be assembled directly over them. Using the patterns given, cut 18 of the regular and 2 of the tip ribs from soft 1/16″ or 1/20″ sheet. Pin all like ribs together and sand to uniformity, then cut the notches with accuracy. Pieces for the tips are cut from 1/8″ sheet and assembled over the plan. Taper the 1/8″ x 3/8″ trailing edges before pinning to place over the plan. Pins keep the ribs in position. Spars are hard balsa: the uppers being 1/16″ sq. while the lower are 3/32″ sq. Leading edge is 1/8″ x 1/4″. Tilt the inner ribs a bit for correct dihedral. Cement all joints firmly, remove from plans and finish the leading edges and tips by trimming with a razor and sandpapering.

Tail surfaces come next; both stabilizer and rudder are of similar construction. Make complete frames using 1/16″ sheet outlines, 1/16″ x 1/8″ strips for spars and 1/16″ sq. pieces for ribs. When dry, remove frames from the jigs and add 1/16″ sq. strips to every side of each rib. The ribs are later cut and sanded to streamline shape indicated. Taper leading and trailing edges to match the ribs.

To obtain fine flights from any flying scale model the propeller must be efficient. Select a hard block of proper dimensions and cut the blank to shape shown. Drill the tiny hole for the prop shaft, then carve a right-hand propeller, by cutting away the back face of the blades until there is about 1/16″ undercamber in each. Make each surface smooth and uniform with sandpaper. Blade thickness is then easily determined as the front is shaved away. Thin the blades as much as possible, still retaining desired strength. Round the tips like the prop shown in the photos. Carefully sand and balance the prop as the final operation. Several coats of light dope, if lightly sanded between each, will produce a smooth surface. A free-wheel gadget to improve glide should be attached to the front and a bearing to the back.

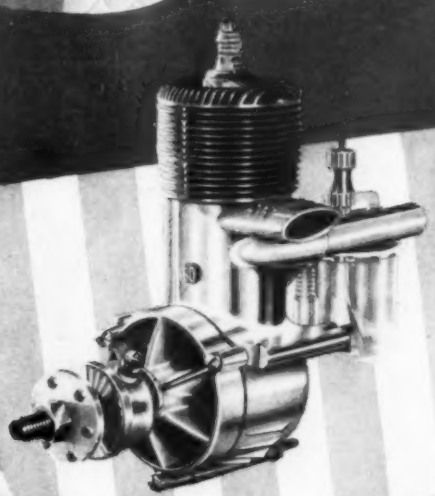
The nose plug is made from laminated squares of 1/8″ sheet with a 1/32″ plywood front. Test flights of the original model showed that several degrees of both right and down thrust are desirable, so drill the hole in this manner. Cement washers to the front and back to fix the thrust line.

COVERING AND ASSEMBLY—Before the frames are covered, they must be lightly but thoroughly sanded to remove all flaws and roughness. Colored tissue is used, banana oil or light dope is the adhesive. Cement cellophane to side windows before covering the fuselage. While performing the latter use numerous small pieces, carefully lapped, to avoid wrinkles; also cover the sheet balsa nose with tissue. Each side of each wing half, stabilizer and rudder requires a separate piece of tissue. Tips, etc., require individual pieces, too. Lightly spray all covered parts with water to tighten the covering—do not, however, apply any clear dope until later.

Prepare to assemble parts by completing the fuselage. Cut a windshield pattern from writing paper by the trial and error method; note the windshield extends over the center section to the first crossmember. Once the pattern fits perfectly cut from celluloid and attach with cement. The landing gear fill-in was made previously and is cemented to the wires. Cover the whole landing gear with tissue. The center landing struts are rounded bamboo splints with streamline balsa covers at the top, representing shock absorber covers. Cement the bamboo to the bottom of the struts but not the top so they can spring apart. Wheels can be made from laminated discs of balsa or may be purchased. Cement bearings to the sides of the wheels so they will revolve smoothly, then place on the axles and hold in place with a drop of solder.

Care must be exercised when assem-

MORE POWER *for* BIGGER WINGS



As FULL scale aviation progresses toward heavier and heavier loadings and wider and wider ranges, model-builders are giving more and more attention to Class C.

Here is a field that is capable of further development by modelers, and that holds valuable experience, not to say thrills, for every modeler.

Planned for a friend to bigger wings, the Ohlsson 60 "Special" combines maximum Class C performance with the durability and dependability for which Ohlssons are famous. Priced for volume sales, the "Special" is stripped of outward frills, but piston and cylinder are micro-lapped to an exact precision never before established for any model engine at any price. The "Special" looks tough, it doesn't look anywhere near as tough or durable as it is. Here is plenty of power for today's competition and tomorrow's developments in Class C. Get your "60 Special" now, and keep in the vanguard of model flying!

OHLSSON 60

Special $18.50

Coil and Condenser Options $1.50 extra

Although Ohlsson & Rice are now working "around the clock"—3 shifts daily—on war orders for the Army and Navy, dealers have been stocked with a full line of Ohlssons for all 3 classes. We also hope to expect to be able to fill modelers' needs continuously for the "duration." Nevertheless, as always, your best investment is a *quality* engine.

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HELP WIN THE WAR

50¢ IN DEFENSE STAMPS INCLUDED WITH THIS NEW BELL P39 AIRACOBRA SET

offer limited from March 10 to May 10, 1942

The Defense Stamp Album with 50c in stamps attached will start you on the way towards the purchase of a $25.00 Defense Bond.

At the same time you learn from this model how this famous U. S. Army Fighter looks in scale miniature. We made sure that this is the finest detailed and best looking flying scale model of this plane in the world.

NEW BELL P39 AIRACOBRA U.S. ARMY FIGHTER

34" Span. Length 29". 1" Scale. Weight 3½ oz. Color silver, etc.

Hundreds of the type of plane of which this is a model are now being used by the U. S. Army and Great Britain. Construction set includes all parts printed on balsa wood, balsa wheels, insignia, rubber, celluloid, axles, prop shaft, 3 oz. silver paint, ½ oz. black, 2 oz. glue, etc., turned prop spinner, full size scale drawing, and all parts to build. Packed in labeled gift box. Const. set, postpaid..... **$3.50**

Note: The price of this Bell set has *not* been raised to include cost of defense stamps. The stamps are our contribution to the defense program.

This offer not open to dealers or stores

Why are thousands of aviation air cadets, lieutenants, captains, and other officers building our models? Because our models are the finest detailed and best equipped scale models in the world, and the closest reproductions of the actual planes that these men fly!

NEW MARTIN B26 U. S. ARMY BOMBER

40" Span. Length 35". 1/8" Scale. Color Silver

A beautiful model of the world's fastest bomber. Set has all parts printed on balsa, propellers, wheels, insignia, 4 oz. silver paint, 1 oz. black, motor fronts, full size scale drawing, and all parts to build. Construction set, postpaid **$4.75**

Thousands of this type of plane are fighting for the U. S. and Britain

BOEING B-17 FLYING FORTRESS BOMBER

44" Span. Length 30". Color Silver. Weight 6 oz.

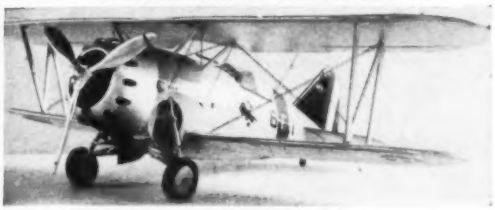
Set has all parts printed on balsa, four 2" turned balsa motor fronts, four 4" carved props, celluloid wheels, set of paints, glue, and full size drawing. Set, postpaid **$4.50**

De Luxe set with 4 aluminum cowls, 4 celluloid motors, 4 metal props, and 2 M & M Air Wheels. De Luxe Set, postpaid **$6.25**

MINIATURE AIRCRAFT CORP.

83 Daniel Low Terrace, STATEN ISLAND, N. Y.

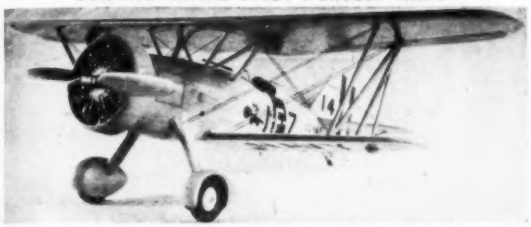
GRUMMAN F3F1
U. S. NAVY SHIPBOARD FIGHTER



32" Span. Length 24". 1" Scale

A fine detailed model with retractable landing gear, 4" turned balsa motor front, 3 oz. grey dope, ½ oz. yellow, 2 oz. glue etc., all parts printed on balsa, 10" propeller, wheels, rubber motor, full size drawing, and all parts. This fighter plane is used in large numbers on the aircraft carriers. Const. Set complete, postpaid. **$3.75**

CURTISS HAWK F11C4 PURSUIT NAVY



32½" Span. Length 22¾". 1" Scale. Weight 6 oz. Color grey, top wing yellow

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD. MOVABLE CONTROLS WORK FROM COCKPIT. A special de luxe model, one of the most beautiful ever made. Set contains a 4½" scale Wright Cyclone celluloid motor, detailed push rods, fins, etc., like real motor, 4½" aluminum cowl, 10" steel type carved prop shown, 2⅛" wheels, tail wheel, star and rudder insignia and lettering, rubber, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walks, ready cut wheel pants, washers, 3 oz. grey paint, ½ oz. yellow, ½ oz. red, 2 oz. glue, etc. All other parts are printed on balsa wood 33"x14" scale drawing. Const. set, complete in labeled box, postpaid..... **$4.50**

NEW RYAN PT21 ARMY TRAINER

30" Span. Length 23". 1" Scale. Weight 3 oz.

A special feature of this model is its fuselage, which is completely covered with sheet balsa, then with tissue—giving it a beautiful appearance. Model has movable controls from cockpit. Set has all parts printed on balsa, set of paints, rubber, wheels, full size drawing, etc. Set, postpaid..... **$3.00**

9-FOOT TAYLORCRAFT GAS MODEL

9 Foot Span. Length 66". 3" scale

MODEL ¼ SIZE OF REAL PLANE. CAN USE RADIO CONTROL

One of the easiest gas models to build. Has special wing airfoil for slow landings. Set has ready cut wing ribs, gear struts, nose piece, etc., set of paints, dope, glue, etc. Model weighs 3¾ lbs. without motor, suitable for radio control. Lifts 4 lbs. additional weight. Full size drawing. Const. set, postpaid, less wheels and motor... **$15.00**

Additional equipment if desired:

18" carved propeller	$ 1.50
5 yards silk	2.50
1 pair 4½" M & M Air Wheels	2.75
¼ h.p. Forster Gas Motor Super 99	22.50
¼ h.p. Ohlsson 60 Special Gas Motor	18.50

SEVERSKY P35A ARMY PURSUIT

32" Span. Length 25". 1" Scale. Color, Silver

Set has 4" turned balsa motor front, 10" carved prop, balsa wheels, tail wheel, rubber, all parts printed on balsa, 3 oz. silver dope, ½ oz. black, 2 oz. glue, etc., insignia, and full size scale drawing. New improved model has retractable landing gear and movable controls from cockpit. Set, postpaid..... **$3.25**

NEW TAYLORCRAFT SPORTPLANE

36" Span. Length 22". 1" Scale. Weight 2 oz.

A beautiful exact scale flying model with unusual flying range, so light it will rise from land or water in 6 feet. Const. set contains all parts printed on balsa, carved propeller, hardwood wheels, 2 oz. white dope, ½ oz. black, glue, full size scale drawing, all parts to build, and parts to make floats. Set p.p..... **$1.50**

NEW MASTERPIECE DE LUXE SOLID MODELS

REPUBLIC P43 LANCER
Solid Exhibition Model

14" Span. Length 9". 3/8" Scale.

Set has completely finished fuselage, headrest attached, cockpit cut out, etc., scale cast motor, cast propeller, wheels, paints, wings, etc., cut to shape, drawing, etc. Set, postpaid..... **$2.50**

CURTISS P40F
Solid Exhibition Model

14" Span. Length 12". 3/8" Scale.

Set has completely finished balsa fuselage, wings, etc., cut to outline, cast propeller, paints, drawing, and all parts. Set, postpaid..... **$2.00**

BOEING F4B4 NAVY FIGHTER
Solid Exhibition Model

22½" Span. Length 14½". ¾" Scale.

Set contains completely finished balsa fuselage, with cockpit cut out, and headrest attached; all you have to do is paint it. The wings, tail, and rudder are all cut to shape, but have to be sanded to proper curve. A 5" celluloid motor with aluminum motor front, 3½" tapered aluminum cowl, 7" scale propeller, wheels, complete set of colored paints, glue, filler, and full size drawing. Set, postpaid..... **$4.50**

NEW 1942 CATALOG 10c

Beautiful catalog with large photos of these and other scale models, motors, etc. *Send 10c coin.*

CURTISS F11C4 SOLID MODEL

10½" Span. Length 7½"

This is a special de luxe solid model. Set has completely finished balsa fuselage, cockpit cut out, routed pants, wings cut to shape, 1½" de luxe cast motor, alum. cowl, 3 bladed cast prop, paints, drawing and all parts. Set p.p..... **$1.50**

MINIATURE AIRCRAFT CORP.

83 Daniel Low Terrace, STATEN ISLAND, N. Y.

bling the surfaces to the fuselage to keep everything in perfect alignment. First cement stabilizer to place; it is parallel to the work bench. A tissue fillet is placed from fuselage to stabilizer before the rudder is set in position. Off-set the rudder about 1/16" for a right circle glide. Wing tips must be dihedraled about 1-1/2" for proper stability. Be sure to attach the wings firmly. Wing struts are shown; assemble and color before cementing to position. The entire model is now given one or two coats of clear dope.

There are numerous minor details added to improve appearance. For the more ambitious builder the four-cylinder engine offers plenty of possibilities for detail. Insignia, letters, control surface outlines, etc., etc., are all made with colored tissue. Tail wheel and similar parts are made from balsa scraps. Additional details can be found on photos of the big "grasshoppers" for those interested in reproducing every item. Naturally any uncolored wood parts should be doped to match the color scheme.

Bend the propeller shaft from .040 music wire. Slip the nose plug, several washers and prop on the shaft in that order, then bend the shaft end as required for the free-wheeler.

FLYING—Depending on the finished weight of the model, ten or twelve strands of 1/8" brown rubber is required for power. Lubricate the strands, hook them on the prop shaft and then drop the other end through the fuselage. As shown, a bamboo pin holds the motor in the rear. If necessary, remove a small section of covering to aid in getting the motor in position.

The Taylorcraft "grasshopper" should balance at a point about 1/2 back along the wing chord. Add weight to the nose if necessary to obtain this balance, since only minor adjustments are made by warping tail surfaces. Glide the model over deep grass making any further adjustments for a good glide.

Power flight adjustments are made by off-setting the thrust line. Start with just a few turns—then use more power as justified. Placing a sliver of wood between the tip of the nose plug and the nose tilts the thrust line down, helping to iron out stalls under power. Right or left thrust helps to control the circles.

Once the "bugs" that usually show up in first tests are eliminated, use a mechanical winder to get maximum turns and power from the rubber motor. Take care where you launch your "grasshopper," for the top of a tree or the side of a building is hardly a suitable landing field; you have quite an investment of time and effort in your Taylorcraft—protect it with good judgment!

VICTORY

Super Flying Fortress

(Continued from page 13)

cantilever wing monoplanes. The following year the ship appeared as a twin engine bomber, known in the Air Corps as the B-9 and set many records for speed, load and maneuverability for a ship of great size. Through invaluable experience gained in structure study and design factors in this first Boeing bomber, model 299 appeared in July, 1935, and caused an immediate sensation. After brief preliminary tests, Les Towers guided the ship across seven states and reached Wright Field just 7½ hours after leaving Boeing Field in Seattle at an average speed of 265 miles per hour, sensational indeed for the largest landplane ever built in this country particularly at a time when tiny pursuit planes were capable of only 235 m.p.h.!

Les Towers lost his life in the crash of this model 299 at Wright Field when he attempted to take off on a test flight with controls locked in neutral position. The plane was destroyed by fire and it was not until many months later that a second machine was ready to undergo strict Air Corps tests. Passing these with flying colors, Model 299 proudly wore the YB-17 designation of a service military airplane and thirteen were ordered, assigned to squadron duty. An outstanding and permanent success, many more were ordered and recently the Royal Air Force has received a quantity with which it has reached many of its enemy objectives with a greater destructive load over a longer distance than was ever before dreamed possible.

In keeping with the United States' policy of "keep the best for our own defense efforts," Flying Fortress models have not been released to the British unless a later and more deadly model was available for the Army Air Forces. Through the B-17B, C and D models this huge machine has continually improved with greater horsepower, greater load-carrying qualities and enormously increased fire-power, not to mention literally thousands of minor detailed improvements. Comes now the latest and most

Exclusives By Modelcraft

NEW! PRIORITY-PAK BATTERY CASES!

Say good-bye to clumsy battery mounts and battery replacement trouble! Modelcraft's new Priority-Pak cases solve the problem of holding batteries in place, wherever you want to mount them, and completely eliminate trouble or soldering when replacing cells.

Inexpensive. Made of special carton cardboard. *Mosquito-weight.* Finished in 3 colors, with Modelcraft insignia, to make an attractive addition to any model.

Directions for loading on each case. Wires easily attached to built-in screw-thread terminals. 4 cell, size 2¼ x 1¼ x 1¼. Wt. ⅛ oz. 2 cell, size 1¼ x ½ x ½. Wt. 1/10 oz.

You'll want a handy Priority-Pak case for all of your models. Ask your dealer today—or rush order direct. Shipped anywhere, *postpaid*..... 20c ea.

For Service Buy Modelcraft!

For Performance Buy Modelcraft!

THE PEAK OF CLASS B PERFORMANCE. An aviator's model with true aviation lines. Equipped with slots —to smooth out climb, eliminate stalling, and increase glide. 3 hours in the air on a recent flight! These are highlights on Modelcraft's 1942 cabin model, "Westwind." This new model has no superior in glide or *all-around* performance. Tail is quickly removable for convenient transportation. Entire model as near crashproof as a completely up-to-date modern plane can be. Easily built, even though slots are new to the builder. Wing span, 54". Cord 8½". Get yours now for a personal V for Victory. *Kit with wheels, covering, dope, and cement,* only..... $3.85

D-G PROPS

For Values Buy Modelcraft!

WORLD'S FASTEST CLIMBING PROPELLER. Made from select straight grain hard wood. In all tests, including many we did not hear about until they were completed, D-G props have *outpulled* every other propeller tested by from 20 to 35%! A recent West Coast contest winner reports, "I give full credit to your D-G prop. I wouldn't have won without it." No fancy decorations, but finest engineering design and precisioned balance. Order now and have a stock on hand for summer. Not a club in a carload—to break your crankshaft! See your dealer, or order direct from Modelcraft.

30c *Hand-sanded Individually tested.*

MODELCRAFT

Largest Supply House in the West

7306 SOUTH VERMONT AVENUE ★ LOS ANGELES, CALIFORNIA

deadly of the type, the Boeing B-17E "Super" Flying Fortress, our Plane on the Cover this month.

GENERAL DESIGN: The B-17 type is a four-motor all-metal monoplane of stressed skin construction with provisions for 7 to 9 crew members. Its function is heavy, long-range bombardment and has been, to date, the most successful design of its type and class.

FUSELAGE: The B-17 fuselage is built in one single section to which are attached wings, tail surfaces and nose gunner compartment. Built up on a series of vertical frames and bulkheads, it is divided into four major compartments: nose gunner, pilot and control, bomb bay and after section. To these frames are attached longitudinal stringers of extruded section and over this framework is riveted Alclad sheet skin covering with suitable recesses to provide for gun turrets, doors, inspection plates, etc. The B-17E fuselage varies from earlier models being longer to provide for a tail gunner; the former tapered extremely to a point.

WING: This is built up on a framework of two heavy spars of upper and lower caps with trussed web rather than solid sheet web normally used on smaller designs. Boeing-designed rib construction is similar to spar in that two cap strips moulded to airfoil contour are strengthened with vertical truss bracing riveted. These are connected by lateral stringers, the whole covered with Alclad sheet skin riveted. Wing is built in sections, center section mounting two inboard engine fittings, inner panels mounting outboard engines, outer panels and the wing tips completing the structure. Joints are heavy flange bolt angles quickly assembled and disassembled for replacement and repair. From the rear spar aft is a false structure made up of light stiffeners and intercostals supporting the trailing edge. The inner and outer panels are fitted with split flap sections, the outer also carrying the aileron fittings.

TAIL SURFACES: Tail surfaces are full cantilever with fixed stabilizers similar in construction to the wing. Movable surfaces, elevator and rudder, are of metal construction, fabric covered, fitted with trimming tabs controllable from the pilot's seat in flight. All control surfaces are statically, dynamically and aerodynamically balanced. The vertical stabilizer (fin) has been faired to a point one-half forward on the fuselage to provide great anti-spin and quick-recovery qualities. The rudder has been mounted higher than on earlier models to provide for the tail gunner and is of balanced design.

LANDING GEAR: Landing gear of the B-17E is of conventional two main landing gear wheels and tail wheel at the rear portion of the fuselage all being retractable, with small portions protruding into the slipstream to prevent excessive damage to the fuselage underside in the event of an accidental "wheels-up" landing. The main landing gear assembly consists of a single cantilever shock strut made up of a hydraulic shock-absorber leg with heavy anti-torque links, hydraulic brake assembly and a brace strut extending forward and up into the inboard nacelle. Retraction consists of the movement of a hydraulic actuating strut that breaks the forward brace strut at its mid point. This pulls the main wheel assembly forward and up into the nacelle, a small plate service to seal the wheel-nacelle joint effectively. The tail-wheel also retracts up into the fuselage.

POWER PLANT: The Boeing B-17E is powered by four Wright Cyclone engines of geared radial air-cooled nine cylinder design, fitted with an exhaust-driven turbo-supercharger. The two-speed supercharger control gives this engine the following power ratings: Maximum rating (low blower) of 1,000 Hp. at 6,900 feet, and a maximum rating (high blower) of 900 Hp. at 15,200 feet. The takeoff horsepower, maximum available for short duration, is 1,200 horsepower at 2,500 r.p.m. at sea level. The exact power available at altitude of this engine is not known because the turbo-supercharger increases engine standard rating immensely, particularly at altitudes above 15,000 feet and it is entirely possible that 2,000 hp. can be developed by these engines. One engine weighs 1,320 pounds empty. This power is delivered by four Hamilton Standard three-blade all-metal constant speed propellers. The supercharger turbines and inter-coolers are located on the extreme underside of each nacelle, whereas the exhaust manifolds are mounted on the outboard side of the inboard cowlings and the inboard side of the outboard cowling surfaces.

FUEL AND OIL: Two main fuel compartments are carried within the wing center section. Two smaller tanks are

carried in the inner wing panel and two in the outer panel. These six fuel compartments are constructed of leak-proof composition. Fuel loads can be quickly and easily increased through the addition of auxiliary fuel and oil tanks and a B-17 type bomber has gone aloft with more than 3,000 gallons of gasoline aboard.

ARMAMENT: Armament aboard the B-17E is powerful and deadly with a large variety of guns, cannons and bombs. In the nose are swivel socket mounts for 50 calibre machine guns. Above and behind the pilot's compartment is the main upper gun turret, of the power-driven hydraulically operated type, provided with a number of light cannon or a single cannon of heavier calibre. A similar turret is located underneath the rear fuselage to give belly gun protection. On either side of the rear fuselage are windows and sockets into which may be inserted 50 caliber machine guns should main turrets fail, cannon ammunition give out, or the operation of the gun-turret combination be damaged by a direct enemy shell hit.

The remaining gun implacement is located at the extreme rear point of the fuselage. The gunner sits facing to the rear with his knees tucked up. He aims through a conventional gun-sight, and small glass sections providing adequate vision to the rear.

The bomb bay of the B-17E has been increased slightly over that of earlier models which had a proportionately smaller cargo space than normal for its giant size. Two bomb doors hinge outward and downward, hydraulically controlled, to prepare for bomb release. Within this giant hold, are bomb racks to accommodate anything from a tiny incendiary to a giant 4,000 pound demolition bomb. (These latter types have actually been dropped from Flying Fortresses operating with the Royal Air Force over German-held Channel countries.) A total service load of 16,350 pounds is carried by the B-17E which means at least 6 tons of bombs!

ACCOMMODATIONS: The crew of the B-17E is made up of 7-9 normal crew members and adequate provisions (and duties) for as many as 12. There is a pilot, co-pilot, radio operator and engineer located within the central control cabin at the forward part of the fuselage. There are four gunners, as described above, and a mechanic or technical officer (non-com.) is usually carried.

DIMENSIONS AND WEIGHTS: The Boeing Super Flying Fortress has a wingspan of more than 103 feet, is over 72 feet in length, stands 15 feet 4-1/2 inches high, has a total wing area of more than 1,400 square feet and an aspect ratio of 7.25. Empty structural weight is 31,150 pounds. Fuel and oil may be carried to exceed a gross load of 52,500 pounds.

PERFORMANCE: The Boeing B-17 type has a top speed in excess of 300 miles per hour and cruising speed of more than

225 miles per hour, with a service ceiling of over 36,000 feet and a normal range of 3,500 miles at cruising speed.

So remarkable has been the power, strength and efficiency of this mighty Flying Fortress that it has been accepted as the standard U.S. Army Air Forces type and is now in full scale production not only by Boeing but several of the nation's leading aircraft manufacturers. The "B.V.D." arrangement, under which the B-17E is being built, calls for Boeing Aircraft Company, Vega Airplane Company and Douglas Aircraft Company to construct this potent bomber type. Although exact production figures have not and cannot be released, it is planned to finish at least 100 of these bombers a month this year and 500 a month the first of next. Such a bomber fleet may well be air borne by this time next year sounding the death knell of those forces which oppose man's right to a free and democratic way of life. History will record the part these Super Flying Fortresses played to prove that "weak" Democracy can muster far greater power than "strong" dictatorship.

VICTORY

Air Ways

(Continued from page 31)

that it has won many first places in California, and at San Diego took first place with a flight of 32 minutes, being found almost 40 miles from the starting point. The fuselage is 4 feet long and the wingspan is 40 inches. 120 feet of 3/16" flat brown rubber is used. On a number of occasions it has climbed out of sight with a 2 minute motor run.

Pennsylvania

Mr. Harry G. Vogler, Jr., tells us he has just established a system of motor registration to discourage motor thefts and recover those lost. We are sure Mr. Vogler will be glad to explain his system to models, and send registration cards, if they will write him at 1633 Duffield Street, Pittsburgh. A stamped, self-addressed envelope should be enclosed for return of registration cards and data. Mr. Vogler will also send a list of the 20 contests to be held in the Pittsburgh area this coming season.

Mr. Vogler's idea of motor registration is an excellent one, however, we wonder if this is the correct way to attack the problem. Evidently a model fan who steals motors is not the type fellow who is fundamenally interested in the game. Apparently there are 2 classes in model work: Those who go in it as a hobby for the pleasure of designing, building and flying planes and those who enter contests to win money and other prizes, or, incidentally, to walk off with somebody's else's property. If you wish to stop this sort of thing it can be done easily. The answer is stop giving prizes—at least elaborate ones—offer awards of very simple gold, silver and bronze medals. These serve as symbols of achievement without contributing to the pocketbook and the mercenary instincts of the individual. It is true there will be fewer model builders at contests but at least it will be a real contest. The value in this case cannot be measured by quantity but rather by quality.

MODEL AIRPLANE NEWS has proposed a Model Airplane Sportsman Association to deal with such situations, to be composed of those who are in models for the love of this sport and not for selfish reasons. More will be heard about this in our next issue, together with a number of interesting letters we have had from readers.

At a meeting of the contest directors and model enthusiasts held on January 18th, at the Boys Club of Pittsburgh a keynote of unified effort was struck, and a program that represents the most comprehensive and equitable program in this entire area. The meeting was presided over by Mr. Carl A. Hopkins of Clarksburg, W. Va. Mr. E. C. DeLannie was Secretary Pro-tem. Delegations were on hand from the many clubs of the area; among the more prominent were the Cleveland Balsa Butchers, American Air Lines Gas Model Club, Steubenville Sky Hawks, Cannonsburg Gunners, West Virginia Model Ass'n., Wood County, W. Va., Model Aviation, I. G. M. A. A. unit one, Model Wings, East Liverpool Model Builders.

With this setup no meet is scheduled within the radius of one hundred miles of the other on any one day. A new organization was born, the Tri-State Association of Model Aviation Clubs, and the officers were immediately elected, as follows: President, Harry G. Vogler, Jr., Pittsburgh, Pa.; Vice President, J. W. Hilligas, Cleveland; Secretary-Treasurer, Mr. E. C. Delannie, Canonsburg, Pa. The purpose of the organization was to make a firm stand for the model builders in this area, and to arrange equitable contest calendars, with proper publicity in regards to the meets. Further, the Motor Registration Service as previously mentioned in these columns is to be a part and parcel of this group's activities.

Colorado

The Exchange Gas Model Club of Denver held its annual election of officers for 1942 at headquarters at the Brown Palace hotel. Forrest Williams was chosen secretary; "Woody" Gorham, president; Harry Campbell, vice president.

Immediately after the election of officers the contest committee announced a contest which will begin at once. This contest will be a rather timely and patriotic one,

called "Bomb Tokyo Contest."

All entry fees will be paid in Defense Stamps, as will all prizes to winners.

Club members are very enthusiastic over this contest and all have promised to be at the field with their bombs for Tokyo. The contest will be run similar to the Denver-to-New York contest put on last year, which was very popular.

Rules governing the Bomb Tokyo contest are:

Entry fee—Defense Stamps.

Every second in the air is good for 10 miles of distance to the flier's credit.

Unofficial flights penalize the flyer 25 miles.

Cracked-up flyer gets credit for 100 miles distance. The first flier to "drop his bombs on Tokyo" will win first place. There will be three prizes in all, all in Defense Stamps.

To make the contest more realistic, each ship will carry a small balsa bomb attached to the fuselage.

The Exchange Gas Model Club expects a very active season and wishes to extend its best wishes to all gas model clubs in the U. S. A.

"Keep 'Em Flyin'."

New York

The recently formed Sky-Lancers, with headquarters in Hempstead, L. I., have kept the ball rolling on flying activities for the winter season by flying nights, as this seems to be the only time the wind goes to bed. Calm air and a bright moon has drawn the entire membership of the Sky-Lancers out on the Hicksville flying field on several Saturday nights after club meetings.

The nine charter members of the organization have decided to limit the membership to a maximum of twenty active modelers. The membership has already increased to twelve, leaving space for a possible eight more.

The recently elected officers of the club are: President, Ed. Yulke; vice-president, Bert Bedell; treasurer, Jim Hamelman; secretary, Doris Meyer.

Any active model builders living in Nassau county in the vicinity of Hempstead wishing to join the organization can contact the club secretary, Miss Doris Meyer, at 44 Harte St., Baldwin, N. Y., by mail.

Pennsylvania

The West Philadelphia Model Club held its third annual banquet on January 10th. It was attended by such notables as Al. Lewis, Mr. E. N. Angus and Joe Simcox, the guest speaker. Commander Barnaby of the Navy Yard was unable to attend. There were 70 fellows present and almost every club in Philadelphia represented.

This was a climax to a very successful year. Winners of club prizes were: First, Harry Appoian; second, Bob Lieber; third, Ed. Slobod. Officers for the new year are: President, Harry Allison; vice-president, Don Rothera; secretary, Allan Miller; director and treasurer, Thomas Rothera.

Anybody interested in joining this club should contact Robert Lieber, publicity director, at 6223 Pine Street, Philadelphia.

Courses at Temple University

Realizing the rising tide of popular interest in the handicraft of model building, one of the great universities of the East, Temple University, has added "Model Building" to their extensive offering of Evening Hobby Courses.

In considering the subject, "How to teach it . . . Whom to teach it," the name of Paul Karnow came to mind. As a result, he has been selected to instruct students in this fascinating course of Model Building.

Mr. Karnow, Megow's head of research, will give intimate, first-hand instruction in the proper approach to building model planes, model ships and model railroads. Students will be taught by doing . . . the actual work to be performed right at the bench in the classroom. The course began Wednesday evening, October 15th, at 8:00 p.m. and is held each Wednesday evening thereafter for 13 weeks. The tuition is very low.

California

M. J. Sked of 327 North Street, Woodland, writes:

"Though a little late I would like to report on the Woodland Gas Model Club A.M.A.—sanctioned gas model meet held Sept. 15th at the Woodland Model Airport, on the Conway Ranch. Weather was fine; the only Sunday in six weeks that we did not have a howling north wind.

"Mr. A. R. Timberlake of Sacramento directed the meet; we had 90 entries. (Northern California never has the large entry that the Southern California meets get.) Everyone had a good time and we have received many nice reports on this meet from contestants and spectators.

"Richard Bertolucia of Sacramento established his class A record of 7.04 at this meet. The Academy of Model Aeronautics has already recognized his performance.

"Ralph Beebe of Vallejo, class C, won the trophy and cash award. His time was 17-03.5 average—other winners were:

"Class C

"Bill Steese, Oakland, 16-02.9
K. C. Knowles, Oakland 9-08.5
Gene Larson, Oakland, 9-02.2
Paig Brew, Lakeport, 8-03.9
Arle Armstrong, Fresno, 8-01.8
Don Foote, Oakland, 8-01.6
Bill Dunham, Fresno, 7-09.9
Richard Bertolucia, Sacramento, 7-04.3
Leland Seghetti, Vallejo, 6-06
Bob Polson, Vallejo, 5-24
Ivan Davies, San Francisco, 5-08.4
Fred Easton, Sacramento, 5-09
Lee Ross, Oakland, 5-06.5
John Drobshoff, San Francisco, 5-05
Jack Dyer, Brisbane, 5-04

"Class Prizes

"Class A, Jack Dyer 16-21.5
Class B, Fred Easton 12-24.5
Class C, Ralph Beebe 38-49

"The thermals were out early. Several long flights were recorded. Only 8 planes were lost at the close of the meet and all but 3 have been recovered.

"We saw Don Foote's parachute dethermalizer work that day. I believe that dethermalizers and not increased wing loading is the answer to the O.O.S. flights."

Washington, D.C.

The Capital Model Aeroneers will hold an A. M. A. sanctioned contest on Memorial Day, May 30th. Anyone interested in at-

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tending should contact Charles T. Weiss, contest director, at 508 B Street N. E., Washington, D. C.

Notices

Arthur Bloom of 3123 W. Columbia Ave., Philadelphia, has a number of back issues of MODEL AIRPLANE NEWS, going back as far as December, 1929. Anyone who would like these issues should write him.

Bob Miller of 3514 Elizabeth Street, Denver, Colo., needs some new piston rings for his Brat motor. The piston is 5/8" in diameter and the grooves 1/16" in width. Can anyone tell him where he can get some?

Mr. L. de la Espriella of Cartagena, Colombia, Box 160, would like to correspond with other model fans from various parts of the country. He has many ideas which may be of help to those who wish to write him.

Ronald J. Ross also wishes to correspond with other modelers. Write him at 132-24 Maple Avenue, Flushing, N. Y.

Ray Smith of "St. Quentin," Broomfield Rd., Chelmsford, Essex, England, writes: "Could you please put me in touch with a boy of my own age, living in the U. S., who builds model aircraft as a hobby. I am 16 years old, have built and flown many planes, the latest being a 50 inch all balsa sailplane of American design. I do a lot of shooting and am very fond of running. I will exchange photos, model magazines, plans, and ideas."

Lewis M. Gunson of Puewera R. M. D., Whangarei, North Aukland, New Zealand, would also like to have an American pen pal of any age, interested in building model planes, especially rubber models.

Another fellow who likes to write letters and hopes others do is Wesley Malley of 2311 E. 6th Avenue, Spokane, Wash.

Lost Model

Stan Anderson of 1360 Virginia Avenue, Glendale, Calif., lost a Mercury model on October 18th. Wings and tail assembly were covered with yellow Silkspan, the fuselake with blue. The plane was powered with a brand-new Ohlsson "23," No. 18014. The ship was lost near Canoga Park, Calif. A reward will be paid for its safe return.

VICTORY

The Mulvihill Trophy Winner

(Continued from page 9)

ter-grain balsa to withstand wing rubber tension. Now cement the ribs in place and add the leading edge which should be hard 1/8" sq. balsa. The spar should be cut from medium straight grain balsa. From the third rib, taper the spar to 1/8" sq. at its tip. Cement wing tips in place and allow sufficient time for drying. Crack the wing at the dihedral points where shown and cement the 1/16" sheet gussets in place. When all joints have dried sandpaper the entire wing to remove all excess glue.

RUDDER AND STABILIZER—The stabilizer is built in the same manner as the wing except that the dihedral is omitted and two 1/8" sq. medium balsa strips are inserted along the top of the ribs. Rudder is made by laying out the soft 1/8" sheet balsa outline with the soft 1/8" sq. rudder post. When dry, remove from the plan

and add the 1/16" x 1/8" ribs.

PROPELLER—The propeller is the most important part of the ship; both blades must be equal in area and weight and should run with no vibration whatsoever. The curved line is about 5/32" from the straight diagonals at its thickest point. The propeller is carved from medium balsa with about 3/16" cup. To have a really beautiful propeller, finish with three coats of thinned out glue with a rub-down with 10-0 wet and dry sandpaper after each coat. After the folding unit is attached so that the blades fold snugly against the fuselage sides, wax the propeller and polish it with soft flannel cloth. The nose block is made from medium soft balsa with a 1/8" or 3/16" plywood backplate. The nose plug should fit snugly but should not necessitate forcing.

COVERING—The entire ship should be gone over with a 2-0 sandpaper wrapped block to remove bumps that spoil a good covering job. The model should then be covered with the tissue grain running spanwise on wing and tail. The fuselage bottom should be double tissue with grains at right angles. The rest of the body should be covered with single tissue, the grain running lengthwise. After water doping, the wing and tail are given two coats of light dope while the muselage is given two coats of thicker dope. A good color scheme makes it easy for the builder to see his model while it is in flight. The Mulvihill Trophy winner had a red body with yellow wing and tail assembly.

FLYING—The model is very simple to adjust. A 1/8" by 1/4" piece of balsa is glued under the wing spar to give incidence. Glide the ship until the approximate wing position is determined. Put a few turns into the rubber motor and adjust for a fairly tight right circle. Add necessary down- and side-thrust to give it a tight right spiral climb. Twenty-two strands of 3/16" brown rubber forty inches long will provide ample power.

Under full power the model will climb straight up for 15 seconds. Then without stalling, it will go into a tight right spiral climb. After about 40 seconds more, the model will level out, propeller will fold, and the ship will go "thermal hunting" above 500 feet. In still air the model may be made to average between 4 and 4 1/2 minutes.

VICTORY

Flash News

(Continued from page 2)

Administrator of Civil Aeronautics of C.A.A. His duties will be regulation and control of civil aviation and agencies, communications, civil pilot training and appraisal and acquisition of private aircraft. First move was prohibition of civil flying within 200 miles of Pacific Coast from Mexico to Canada.

Erik H. Nelson, pioneer Army Air Corps long-distance flier and engine expert, has returned to active duty with the Army Air Forces as a Lieut. Colonel assigned to the Inspection Division of the Office of the Chief of the Air Corps. Nelson resigned from the Air Corps in 1928 after hanging up goggles on a dozen spectacular achievements among which are the first round-the-world flight in 1924 by Douglas seaplanes, a 6,000 mile survey flight to Puerto Rico, a New York-to-Nome flight in 1920, a 4,000 mile flight from the Gulf of Mexico to the Pacific Coast and return, during which the first aerial photographs of the Grand Canyon were made, and a 7,000 mile recruiting flight of four planes around the United States. Nelson later became vice-president and director of Boeing Aircraft in Seattle, Washington.

Another one of those "believe it or not" stories that actually happened: Instructor Jay McCausland and Cadet Derek M. Sharp of Yorkshire, England, undergoing flight training for the Royal Air Force at the Army Air Corps Training Detachment at Tuscaloosa, Alabama, were working at about 500 feet when an air bump threw Sharp into the air. The tail caught him in the back of the neck and he managed to grasp the tail wheel in passing. McCausland, civilian instructor on duty with the Army, felt the tail go down due to the weight and attempted to level out when he discovered his passenger had disappeared! He wagged his rudder and to his surprise Sharp, from the tail wheel, reached up and wagged the rudder back at him! With great skill, McCausland managed to climb to 2500 feet from which Sharp managed to open his parachute and glide to safety. After the narrow escape Sharp said: "I've seen that happen lots of times in England!" Americans, evidently, aren't the only wags.

America's refineries are now producing 44,000 barrels of 100-octane aviation fuel each working day! Within 90 days this production will be 50,000 barrels daily, or 2,100,000 gallons, greater than total capacity of the rest of the world combined, according to W. M. Boyd, Jr., president of the American Petroleum Institute.

Spitfire and Messerschmitt fighters are having dog-fights—over the fields and houses of Ohio in the United States! Now being tested by Air Corps engineers are the following pieces of European aviation equipment: Hawker Hurricane fighter, Supermarine Spitfire fighter, Messerschmitt Me-109 fighter, Boulton-Paul Defiant combat plane, Vickers Wellington bomber, and a twin engine German Junkers bomber! Now stationed at Wright field, Dayton, Ohio, these ships have been pitted

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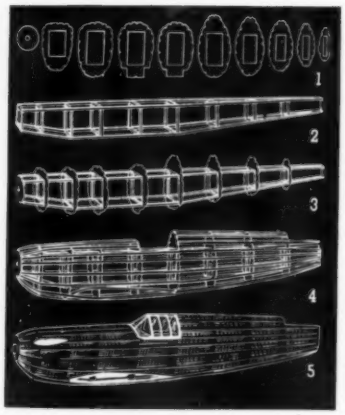

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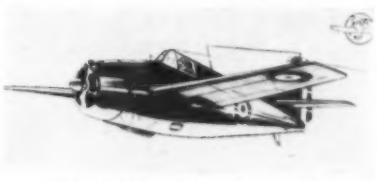

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Other models in this series now in preparation. Watch for announcement.

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against each other and against late-type American pursuits and bombers for comparative analysis. Many valuable lessons have been learned and more equipment has been promised shortly by the British Air Ministry. The German machines tested were captured intact.

That America is serious about parachute troop transporting gliders was evident recently when a contract was awarded to Allied Aviation Corporation of Baltimore for construction of an undisclosed number of 12-place gliders having the approximate dimensions of a Douglas DC-3 airliner (span 95 feet, length 65 feet!). Preliminary drawings released indicate that the sailplanes will closely resemble the giant transport after which it was fashioned.

Tons of data accumulated during the last half century at the hundreds of U.S. Weather Bureau stations throughout the world are now gathered in New Orleans where a small army of W.P.A. clerks and statisticians are probing into the 25,000,000 reports of temperature, barometric pressure, and wind velocity taken three or four times each day by U.S.W.B. observers, trappers, missionaries, miners, etc., appointed for the task. From this analysis will come invaluable knowledge from which safe predictions may be made by air force meteorologists before sending squadrons out for action. Particularly valuable are the 2,000,000 observations made in the Alaskan region in the past ten years at 100 strategic points.

The Navy, too, is vitally interested in gliders, although whether this is for strictly training purposes or for war action was not disclosed. Schweizer Aircraft Corporation, of Elmira Heights, New York, has delievered a training sailplane to the Naval Aircraft Factory which if accepted may mean construction of a large fleet. Known as the LNS-1, the ship is a two-place midwing high performance sailplane with completely enclosed cabin.

Comparative figures: airline traffic for first ten months of 1941 was 3,188,431 passengers, 37.16% MORE than the same period in 1940. Bear in mind this increase was before the Pearl Harbor attack and air traffic has increased enormously since. Greatest gain, however, was in air express carried; 15,134,792 pounds, 51% more than 1940. The great gains in this type of flying cargo can be directly attributed to the lowering of rates.

Major General Mason M. Patrick, often described as the "finest" Air Corps Chief ever to hold the office, died recently in Washington's Walter Reed Hospital after a month's illness. First Chief of the Army Air Corps, Patrick was directly responsible for the many long-distance flights which, as much as any other factor, served to mold public opinion and advance the cause of military aviation efficiency. Patrick was in charge of Air Service in France and made that valorous corps a group admired by flying men the world over.

Following are new aviation cadet requirements:

1. Age 18 to 26, inclusive. Must not have reached 27th birthday before enlisting.

2. Married applicants must show that dependents are self-supporting.

3. Applicant must be native born American or completely naturalized and a citizen

for at least ten years.

4. Applicant must be at least 64 inches tall ("five-four") and not more than 76 inches tall (six-four"), weigh less than 200 pounds, have perfect eyesight, 75% accuracy on color test.

5. Reserve officers, regular army enlisted men or selectees fulfilling requirements may apply for training through military channels.

6. Applicant must pass new army "screening" test, an examination designed to replace the two years college formerly required.

7. Apply at your nearest Army Recruiting Office.

And if you can't fly 'em, build 'em! Aircraft factories throughout the nation are badly in need of men and prior experience is not necessary although highly desirable. Apply at your local state or city employment office where you can obtain applications for aircraft factories in your vicinity. Do not write to aircraft factories. You must go in person for a physical examination, finger-printing, photographing and you must present your BIRTH CERTIFICATE. If you do not have this, write department of health or vital statistics in the state where you were born.

VICTORY

Modelers Mold Our Fighting Planes

(Continued from page 6)

wing repairs of full size flying craft for return to flight, or (2) applicants must have had six months experience in the construction and repair of wings to full scale in an aircraft factory or government approved repair station, or (3) applicants must have constructed at least one successful flying model airplane which had been entered in formal competition. Applicants must be familiar with wood working tools.

Langley offers opportunities in many specialized fields and one who has received its benefits is ready to take his place in any aircraft factory. The most recent call for modelers demands that applicants have proof of constructing at least, one successful flying model which was entered in formal competition. The prospective Langley employe fills out a regular Civil Service application blank containing the usual questions. A supplementary blank requires that he list the kinds of tools he has worked with, materials, types of model craft entered and flown in contests, whether he has received any prizes awarded in formal competition.

Age limit for Under Aircraft Modelmaker is 16 to 25. Applicants must be in sound health and capable of performing arduous duty. Vision must be at least 20/30 (Snellen) in one eye, and 20/100 in the other. Glasses are permitted. Hearing requirements call for ability to understand ordinary conversation with one ear from at least 15 feet. In certain positions with the NACA, hearing requirements may be waived at the appointing officer's discretion. Rigid physical examination and fingerprinting are given to all appli-

Building an accurate model for wind tunnel test to improve design

Jack McKeon determines the c.g. of a test model

cants (who must be U.S. citizens) before appointment. A modeler who looks like a good prospect is wired to come to Langley at his own expense for a trial period during which time his work is carefully watched. If he shows the proper "stuff" his talents are adapted to a suitable function.

Suppose you've met requirements and hop a bus to Langley. If you've been reading this model aero journal regularly and are familiar with names of outstanding modelers, you'll probably run right smack into them the day you arrive. Yes, there's a lot of them down there.

Tag along with "Tom" Hulcher, one of the first model builders to be employed by the NACA, and myself and have a look at your new "workbench."

As we leave the Administration Building the view of the NACA labs at the field (which is near Old Point Comfort) presents a small fantastic community which undoubtedly reminds you of the late World's Fair structures void of its gay color. Gleaming silver spheres, low rectangular buildings whose sides erupt great aluminum tubes that bend around corners, tall chimney-like towers and a half-mile-long shed identify this community as a landmark of research and progress. In the interiors we find wind-tunnels ranging from 11 inches in diameter used to study propeller blades at sonic speed to huge full scale tunnels where a complete fighting plane with a pilot at the controls flies at the rate of 118 miles an hour without moving!

The first thing Tom shows us is the work shop where as an Under Modelmaker you'll probably get *your* start; a plant where huge wind-tunnel propellers are produced. A single blade of one of these props is composed of about 35 laminations of spruce each one inch thick, glued together. By some advanced process, drying of laminated pieces is greatly accelerated and the 19 foot blade is prepared for shaping to airfoil section. A modeler is using a pneumatic spokeshave which, spinning at terrific speed, leaves a spuming trail of finely ground shavings. Incidently, this ingenious device was invented by a modeler who got tired of the old "draw to" method.

When the modeler finishes this blade's semi-rough formation he lines it up on a long flat table where plywood templates are fastened around it at the proper height and distances from its center. Then he goes to work with a portable circular saw whose blades extend just three inches beyond a guide which runs over the templates cutting a groove to proper depth around the rough propeller surface. The blade surface is then carefully worked down to these saw cuts to a tolerance of plus or minus 0.010. When this blade is completed nine more are fitted to it, forming a diameter approximately 40 feet, weight a little more than 5 tons.

Next, we visit the model shop with a modern setup of latest cutting machines, lathes, band saws, power drills and other

wood working tools. Large model airplanes, wing parts, rudders, stabilizers, floats and hulls are made here. Fashioned of laminated mahogany, these sections are also worked to tolerances of 0.010 inch. Sometimes these modelers put in fifty hours of exacting craftsmanship on certain parts while other jobs require as much as 2000 hours, depending upon size.

The problems attendant to wind-tunnel model design and construction are one of the most important and costliest functions of the NACA's research labs. Modelers construct them for private manufacturers at cost, or the manufacturer may have a model made elsewhere and shipped to Langley for tests. If the model is tested for stability and spinning characteristics, it is constructed of hard balsa, but tests for surface streamlining, location of nacelles, cooling ducts and other exposed areas, require a hard wood model. Surface and finish must be flawless, but in its smaller details this craft need not be too accurate. Exposed parts such as struts, control horns, radio masts, tail wheel and navigation lights are materially overestimated in these drag tests. By reading delicate instruments, model engineers obtain an accurate measure of drag created by body, wings and tail and equivalent parts of the full size machine.

A common alternative test is to take tunnel observations of a model without struts, landing gear, loop antenna, sectional sliding hatches, and upon completion of drag findings, add to the calculated full scale drag figures of the eliminated parts.

A model builder learns why wind-tunnel testing is invaluable when comparative results are desired and where certain properties must be investigated. He learns, too, an airplane's speed can be predicted by such tests on a simple model to within 3 per cent of subsequent flight tests. Modelers conduct tests in the NACA's variable-density tunnel, the only one of its type in which small models can be used to obtain full scale findings. This tunnel is built inside a steel tank containing compressed air, the purpose of which is to increase pressure forces on the model producing the same relation to skin friction forces on actual airplanes in flight. A modeler-scientist explains it this way: "If a model plane is built 1/20 the size of a large plane, it is tested in air compressed to 20 times normal density of 15 pounds or 300 pounds per square inch. For determining lift and drag characteristics of wing sections results obtained with this equipment are accepted as standard."

At our next stop we inspect the "free flight tunnel" where accurate scale models fly under their own power in stability tests. Gas model builders find this especially interesting for the model's size tested in this chamber approximate the ships they build.

Stepping into the tunnel, housed in a huge steel sphere, we watch a modeler who places a four foot craft on the floor. It resembles a Seversky fighter equipped with an electric motor of 3/4 hp. which spins a regular gas engine model propeller. In the fuselage modelers have installed a controlling mechanism composed of a system of solenoids and push rods. Electrical impulses operating rudder and elevators are sent through small trailing wires attached to the model by a "pilot" who sits in a glass enclosure outside the tunnel.

The motor turning a huge four-blade propeller is started and as it roars the tunnel's inclination is changed to equal that of the model's angle of climb, which taking off under its own power flies at the same speed at which the huge propeller is drawing air through the chamber. This in effect is a controlled strong headwind holding the ship steady. This type of craft is called a "dynamic model" with weight distribution exactly as the full scale ship. By the ingenious method in which the model has been built the handling characteristics can be assayed, the best form and area for control surfaces and weight ideal distribution can be established. Throughout these tests a motion picture camera records every action of the model.

If at this point you're fagged, you'll forget about it when you see the "free spin chamber." A large propeller operated by an electric motor located on top the chamber revs at a predetermined speed and into its reversed wash a model with controls set for a spin is tossed. While the ship revolves about its axis it is supported only by the air drawn upward, adjusted to the model falling speed.

Inside the spin chamber is a buss bar, designed to create a magnetic field at the instant the operator flips his switch. After observers have studied the spin through a glass enclosure, a switch is thrown causing electro-magnet impulses to make the rudder kick hard over and lower the elevators—a maneuver that should bring a properly designed ship out of a spin and into a dive from which, with sufficient altitude, it will recover for normal flight. We see a good recovery in the chamber stop the spin instantly and the model assumes a normal gliding angle into a net below—retrieved uninjured.

For these tests of proposed airplanes,

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before you can
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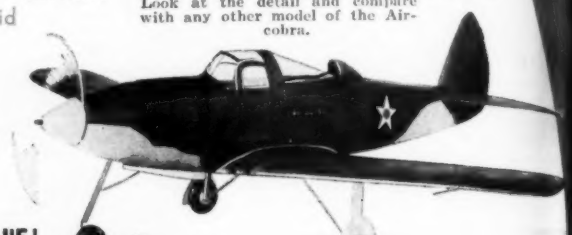

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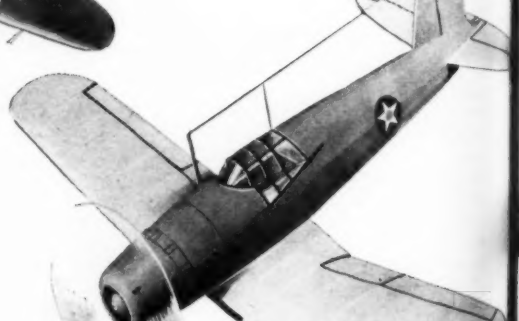

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The first model of the new standard pursuit ship of the U.S. Army. No details other than official pictures have been made public. Berkeley designers were privileged to inspect and watch the "Thunderbolt" perform. This model is as authentic as government regulations will permit.

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- √ New "Phantom" Drawings.

FACTORY APPROVED DRAWINGS

Immediately after the 1941 Nationals, Struck and the Berkeley Engineers with the helpful assistance of the Interstate Aircraft & Engineering Corp., began work to produce America's most advanced model kit. No expense was spared, Many of the details were reduced from the full size plane by photographic process. Unparalleled as a flying model, it has turned in flights of over four minutes, with complete detail as shown!

GAS MODEL TYPE

AMERICAN ACE "30"

30" Wingspan—*Rubber Powered version of the World-Record Holding Gas Model!*

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Those who want the thrill of flying an "Ace" will want to build this new streamlined "honey." Rugged construction with wire landing gear, it turns in flights just like gas jobs. Covers 1500 feet with ease.

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WATCH *Berkeley* in '42!

manufacturers either commission the lab to build the model from their own plans (costing 500 dollars and up) or have it built elsewhere. After it arrives at Langley, model builders go to work dissecting fuselage and tail parts for installation of an intricate 2 ounce electro-magnetic device hooked up to the tail surfaces and ailerons. This job takes about two weeks to get faultless operation. Tests conducted in the spin chamber take up to a month to collect required data and prepare a report for the manufacturer or Army and Navy technical sections.

From these tests our guide tells us, the NACA has learned that empennage design is practically everything in a good spin recovery. Rudder and vertical fin should be large and stabilizer and elevators mounted high so vertical surfaces are not blanketed in spins. If tail assembly design is correct, wing shape makes little difference. With a poor tail however, a thin airfoil helps somewhat toward recovery but lowering wing flaps to pull out of the spin only makes matters worse.

Spin characteristics of multi-engined ships have been tested by distributing lead weights in scale models to simulate engine locations and it was revealed twin and four-engine craft make relatively quick recovery for size and weight.

Another experimental lab of great interest to you is the half-mile-long water tank shed in which hull and float design complexities are probed. Few sights at Langley are more spectacular than the jig-saw-like structure used for towing boat shaped models. From the woodworking sections of the labs come hull and float designs of various sizes and shapes for tests to locate the best position for step and most desirable spray characteristics when applied to full size flying boats.

The test hull or float or sometimes a complete miniature seaplane is attached to the towing carriage which straddles the sides of the 24-foot wide channel-like tank. Engineers perched on the platform observe the reaction of the model racing ahead as the carriage tears down the dark shed at eighty miles an hour, at the same time photographing through a glass bottom the movements of long silk streamers that trace the eddying flow of the water around the hull. From tests like these come the most efficient hull designs of our Navy's flying boats and commercial transoceanic clippers.

An NACA engineer tells us that the toughest aerodynamic punishment inflicted on large planes is the shock of sharp vertical gusts encountered at high speeds. Strengthening wings against this terrific impact involved considerable guess work in the past and more often than not the structural safety factor was too high, resulting in excess weight. Accordingly, the NACA developed a small instrument —about the size of a miniature camera, called a V-G recorder and put a hundred of them in as many domestic airliners and PAA Clippers for about 100,000 hours of flight in all kinds of weather over all sorts of terrain. The V-G or velocity-gravity instrument measured accelerations and air speed of these violent gusts and it was concluded by the lab that the maximum velocity to be expected was about thirty feet per second.

To secure data as to how any particular plane reacted to gust up-sets, the experts went to work on a "gust tunnel." As we watch, a model plane built for this test, is sent catapulting down a track for a takeoff through a jet of up-rushing air to take the "bump." Tiny lamps on the model's nose and tail trace the behavior path of flight for a movie camera while a three ounce V-G recorder in the model offers additional testimony for the records.

The Langley model expert sees why every service type plane for our air forces automatically goes to the huge experimental labs before mass production is started. This huge full scale wind-tunnel, pointed out by Hulcher, is capable of handling planes up to 50-foot spans is essentially for clean-up work on fully equipped planes. Here, a man-carrying ship is hoisted into position facing the open throat of a 60-foot wide tunnel and attached to rigid struts. Twin 35-foot aluminum propellers, each driven by 4000 hp. motors, pull the air past at a speed of 118 m.p.h. The airstream travels inside divided channels to camber shaped guide vanes at one end, which, in turn deflect the airstream down the twin 434-

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- —How lift is generated, and how to calculate it.
- —At what angle to set the stabilizer.
- —How to make your plane laterally stable.
- —How big to make a plane .. how much power it should have.
- —What makes a plane nose dive.
- —What size propeller to use.
- —How to calculate blade area.
- —What pitch is required for a given flying speed.
- —How gas model propellers differ from rubber props.
- —How much rubber to use in a motor for any given weight.
- —How many turns can be stored in a motor.
- —What makes a gas engine run.
- —How you can make your model stable yet efficient.

etc., etc.

●

The Author

CHARLES HAMPSON GRANT

—Princeton Engineering School; Massachusetts Institute of Technology; member of the "Early Birds"; for 20 years the world's foremost model flying authority; for the past ten years Editor of MODEL AIRPLANE NEWS.

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foot return passage-way. At the opposite end the rushing air is deflected once more so that the airstream hits the ship full front. Plane reaction to airstream is registered on recording scales computing lift, cross wind, pitching, rolling and yawing tendencies. Suspended from a steel bridge above the plane is the wake survey apparatus hanging behind the tail for measuring degree of airflow disturbance due to drag.

Here the NACA works on the premise that at 300 m.p.h. or better, no unnecessary projecting surface can be tolerated. Proof of this was verified by a full scale model of the Bell Airacobra.

Full scale tests on the Bell revealed that with certain aeronautical surgery on its already beautiful body would result in improved streamlining and step up speed. The Langley doctors went to work and the Bell lost its side radiator scoops and gained a slimmer figure. It lost the exhaust driven turbo-supercharger that swelled under its belly and acquired a less corpulent engine driven supercharger. Retracted wheels were sealed over flush with the wing surface instead of lodging in open wells. Finally the cabin was lowered six inches. When the "bandages" were removed the Bell left Langley with its drag cut in half and speed stepped up from around 340 miles an hour to close to 400!

The case of the Navy's Vought-Sikorsky shipboard fighter—reputed to be the world's fastest ship—was handled a bit differently. Plans for the F4U-1 were sent Langley where the model building section went to work. The objective was to attack the drag problem before it had a chance to be a nuisance. When the smoke cleared away the NACA gave the ship wing ducts for cooling the oil and to suck air for the supercharger which in turn permitted a smaller engine cowling. The plane emerged as the fastest ship in the country (speed not revealed) and to date it has not been back to Langley for a check-up, which means aerodynamically, a clean bill of health.

On the Grumman Navy fighter and later the Martin B-26, the NACA made another innovation. Instead of placing cooling ducts in the wings' leading edge as in the Vought fighter, it installed them on the leading edge of the engine cowling. Effect was the same and permitted a small engine cowling, also.

The NACA's accomplishments in the service of aeronautical science and research is too long to list here; all service ships go to Langley sooner or later and it is safe to say they will invariably leave the place more efficient and 20 to 50 miles an hour faster.

Engineers at NACA work with problems about which the general public knows little. A new type of plane suddenly makes its appearance as if it had been developed overnight. But this visit has taught you and me that months and even years of research and experimentation have gone into that machine before it is acceptable for the purpose for which it was intended—until, of course, the NACA finds out another way of making it better.

In this vast bureau of research you have become certain of one thing—the place of the model builder. You have been shown around as a visitor but now you must take leave of your guides because a personnel director is approaching to take you to your "work bench" where you will become a vital part of this great experimental institution. Opportunities to digest aeronautical science will be afforded you as nowhere else in the world.

Yes, to you, the same "kid" who counts a hundred and fifty winds of his rubber driven model and who still gets his fingers nicked from the kick-back of a gas model propeller, Langley Field offers the greatest opportunity to make your dreams of success and achievement come true.

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Japanese Army Fighter—Nakajima 96. Single seat monoplane fighter, 27½-foot wingspan. Powered with 550 h.p. Nakajima (Jupiter) motor. Maximum speed: 243 m.p.h.

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